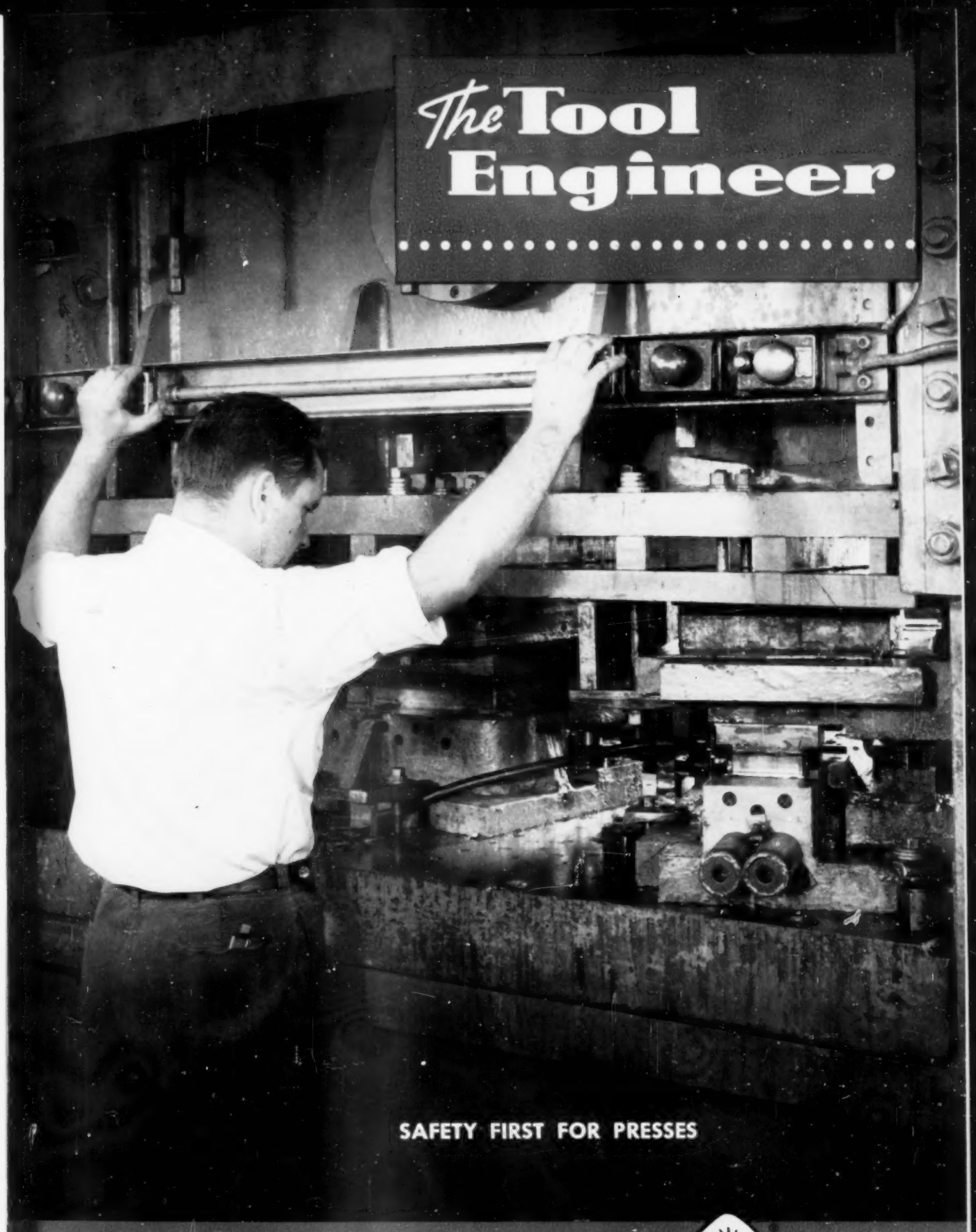


# The Tool Engineer

SAFETY FIRST FOR PRESSES

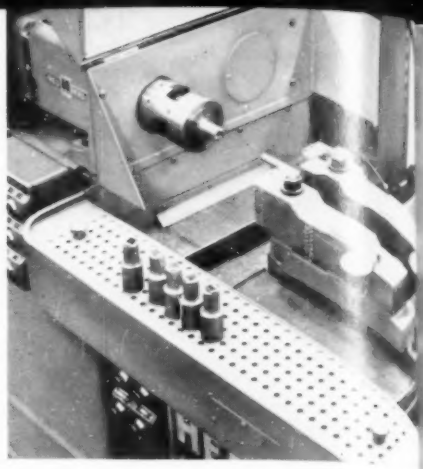
PUBLICATION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS

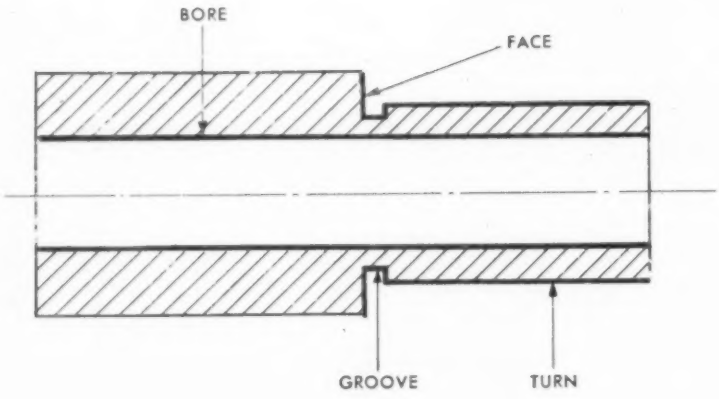
JANUARY, 1953

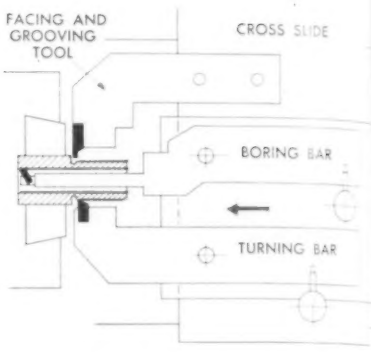
VOLUME XXX, NO. 1

PLANNING ENGINEERING CONTROL OF TOOLING EQUIPMENT PRODUCTION

# *pinion blanks*
# *bored – turned – grooved – faced*
# at 62 PARTS PER HOUR!

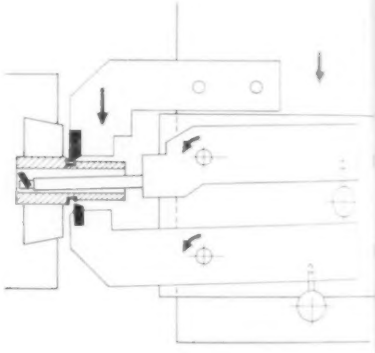





**SIMULTANEOUS BORE AND TURN**

After part is loaded, table rapid traverses to ... and slows to bore and turn simultaneously ... positive stop.



**SIMULTANEOUS FACE AND GROO...**

At end of boring and turning stroke, cross ... indexes forward, retracts boring and turning ... .010" away from work and brings facing ... grooving tool to operate on work — then reset ... a point which leaves all tools clear of the ... surfaces, thus eliminating any drag line a... table runs out to rest.

## *Heald Model 221 Bore-Matic performs four separate operations in one high-speed automatic cycle.*

● When you can precision finish four separate surfaces in less than a minute — loading time included — that's real production efficiency!

The Heald Model 221 Bore-Matic shown above does just that — with a capacity of 496 parts per eight-hour day. What's more, the machine includes provision for future addition of a second work station, which could nearly double this figure.

Tooling consists of two dial bars for the boring and turning tools, plus a tool block mounted on the cross slide for the facing and grooving operations. Boring bars are retracted after borizing to eliminate drag line. Work is held in a quick loading collet chuck.

The entire operation — boring, turning, grooving and facing — is accomplished in a single, fully automatic high speed cycle, as shown at the right.

Remember — when it comes to precision finishing, it pays to come to Heald.

HEALD

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATIC

**THE HEALD MACHINE COMPANY**

**WORCESTER 6, MASSACHUSETTS**

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New...

*Heald precision speeds the nation's production*

The Cover: Both operating buttons must be depressed before the operator can trip this 250-ton press at the Detroit Stamping Co. Since only one operator is required on this particular job, the second set of buttons is locked in by the setup man.


# The Tool Engineer

Volume XXX, No. 1 January, 1953

## TECHNICAL ARTICLES



## ASTE NEWS



## DEPARTMENTS



THE TOOL ENGINEER is regularly indexed in *The Industrial Arts Index.*

## AMERICAN SOCIETY OF TOOL ENGINEERS

**THE TOOL ENGINEER** is published monthly in the interest of the members of the American Society of Tool Engineers. Entered as second-class matter, November 4, 1947, at the post office at Milwaukee, Wisconsin, under the Act of March 3, 1879. Yearly subscription for members, $2.00. Non-members, $6.00. Canada, $6.50; all other countries, $8.00 per year.
Copyright 1953 by the American Society of Tool Engineers.
**OFFICE OF PUBLICATION:** 239 E. Chicago St., Milwaukee, Wis.
**EXECUTIVE AND EDITORIAL OFFICES:** 10700 Puritan Ave., Detroit 21, Michigan.

# for SECOND OPERATION WORK

Wade®

***FAST***

***ECONOMICAL***

**No. 7**

## HAND SCREW MACHINE

This Wade No. 7 Hand Screw Machine is designed for fast, economical production. Especially well-suited for close tolerance work. Cut-away case-hardened steel tool blocks permit the operator to get tools closer to the nose of the spindle to hold closer tolerances. Quick-acting collet closer makes easy and speedy chucking, and fast removal of work. Wide range of spindle speeds.

Spindle speeds, 315 to 3300
1" collet 4-to-1 Hi-Lo Speeds
at finger tips.
Spindle stops without
stopping motor.

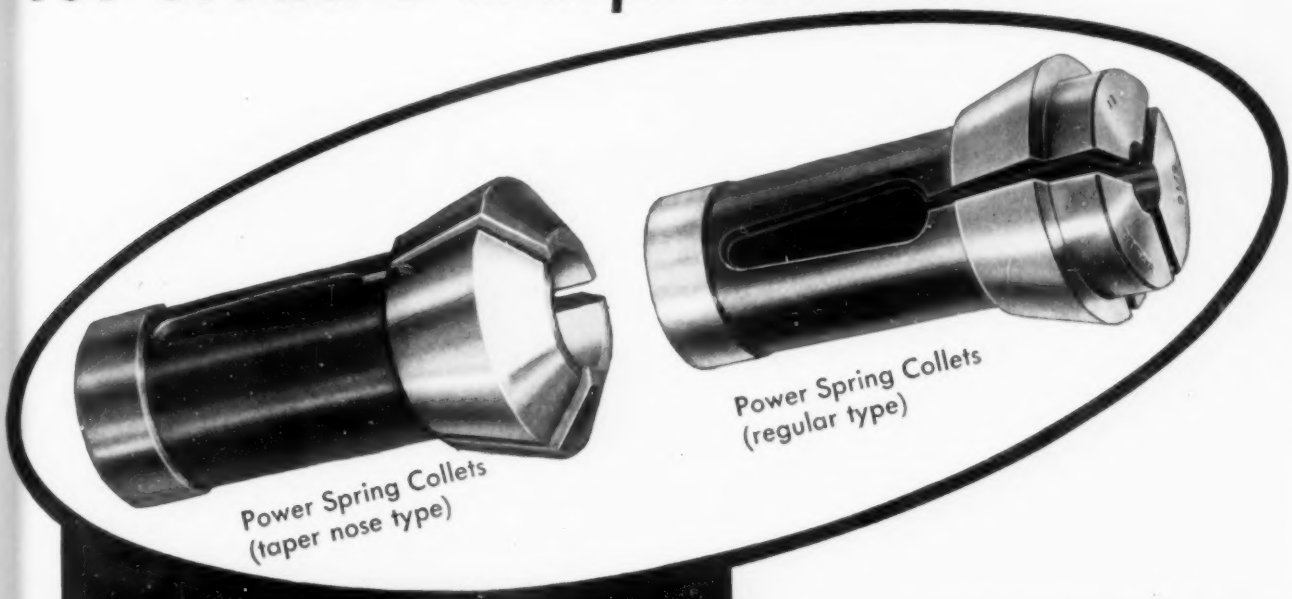
***Send for Catalog***

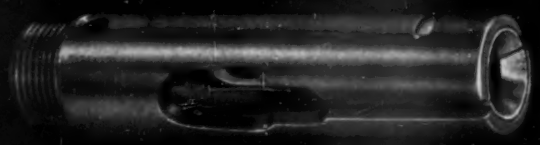
**THE WADE TOOL CO., 59 River St., Waltham, Mass.**

HARDINGE
ELMIRA, N.Y.

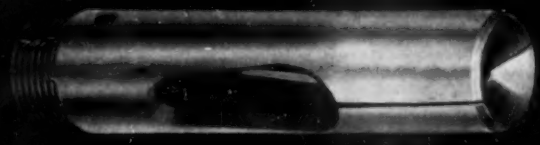
# COLLETS and FEED FINGERS

## for *Brown & Sharpe* machines



Master Feed Fingers and Pads



Feed Fingers (regular type)

Master Feed Fingers with Adjustable Tension for No. 00, 00G, 0 and 0G Machines.

To get maximum production efficiency from your Brown & Sharpe Automatics and Wire Feed Screw Machines — specify HARDINGE Collets and Feed Fingers.

Specifically engineered, customer-shop tested and approved for Brown & Sharpe Machines, Hardinge Collets and Feed Fingers will reduce tooling costs and step up production.

**Write for Catalog 36 — contains complete descriptions, specifications and ordering information.**

**HARDINGE BROTHERS, INC., ELMIRA, N. Y.**

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

# CLEEREMAN JIG BORERS

*Precision—*

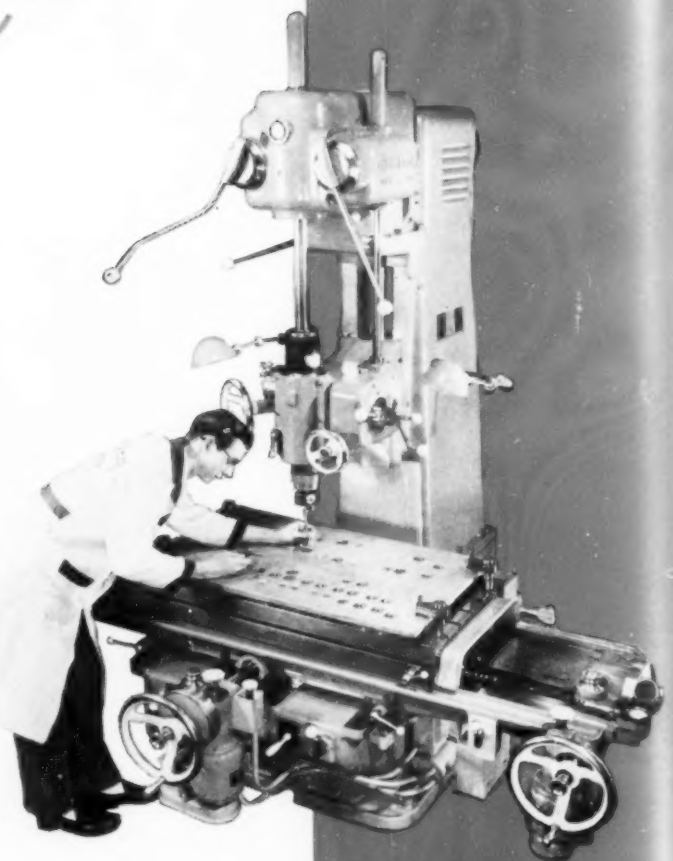
**by**

# CLEEREMAN

**. . . for ultra-fine tolerances on highest quality gage, tool, die, jig and fixture work—and on "jigless" production**

**. . . to stand the gaff in today's high pressure tool room and production plant service**

**. . . for higher profits and higher output through the ultimate in operating ease and efficiency**



BRYANT
Machinery & Engineering
• Company •
General Office
400 West Madison Street, Chicago 6
Representatives in Principal Cities

AFFILIATED WITH

**CLEEREMAN MACHINE TOOL CO.** Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

# IT'S RESULTS THAT COUNT!

STANDARD

# DuBo*

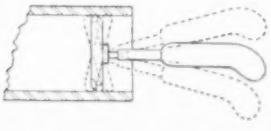
## Plug Gages

**Produce Superior Results**

**COLOR FLASH HANDLES**
"GO" — GREEN
'NO GO" — Red

THE VALUE of a gage is "what it tells", "how well" and "how easily". If the job at hand calls for fixed limit gages, DuBo Plug Gages will give you the best value in dimensional control. DuBo tells MORE, MORE EASILY.

MORE DEFINITE CHECK There is no uncertainty with DuBo as with the cylindrical type gage, whether the hole is smaller than the plug, or larger and merely close. DuBo not only checks dimensional accuracy but also reveals taper and out-of-roundness. DuBo reduces the number of parts needlessly rejected or improperly passed.



### Operates by Tilting Handle

Whether handle will drop freely or not is the definite yes-or-no indication. No guesswork, no forcing, no fumbling!

EASIER OPERATION The DuBo Plug Gage weighs from 70 to 80% less than cylindrical plug gages of the same dimension. It is self-piloting, no trouble at all to enter. A "feather touch" is all that is needed for operation. See diagram at left.

LONGER LIFE Gaging surfaces of the DuBo contact the bore walls only at the instant of making the check. DuBo gives you effective, economical gaging.

Double end DuBo Plug Gages
Under 1.510"

Single end DuBo Plug Gages
Over 1.510"

*Write for Complete Information*

*U.S. and Foreign Patents Granted

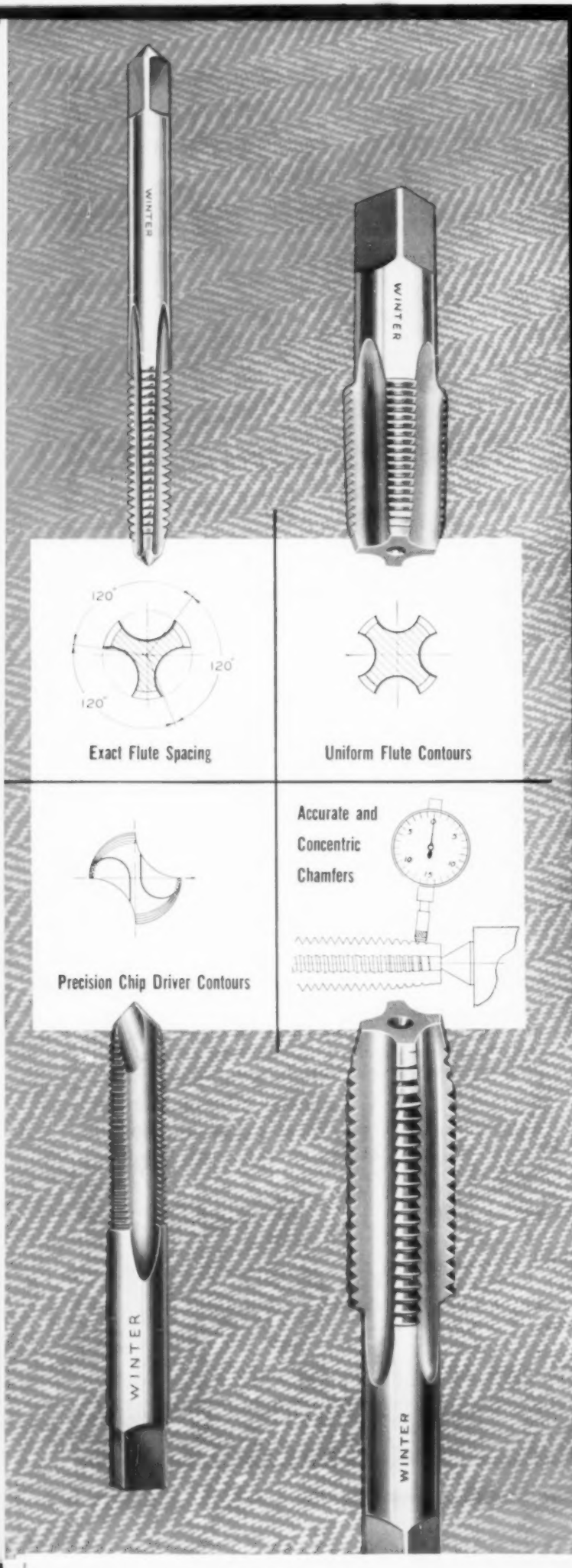
**STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.**

# Lowering the Cost of Tapped Holes: THE PRINCIPLE OF BALANCED Action

It saves money by giving you consistently accurate work, *minimizing scrap losses.* It saves money by giving you *longer tool life.*

**WINTER BROTHERS COMPANY**
Rochester, Mich., U.S.A.

Distributors in principal cities. Branches in New York, Detroit, Chicago, Dallas, San Francisco. Division of National Twist Drill & Tool Co.




**ALWAYS AT YOUR SERVICE**

Your local Industrial Supply Distributor carries a complete stock of WINTER Taps.


# Today . . . Expect To Cut Metals at Lower Cost

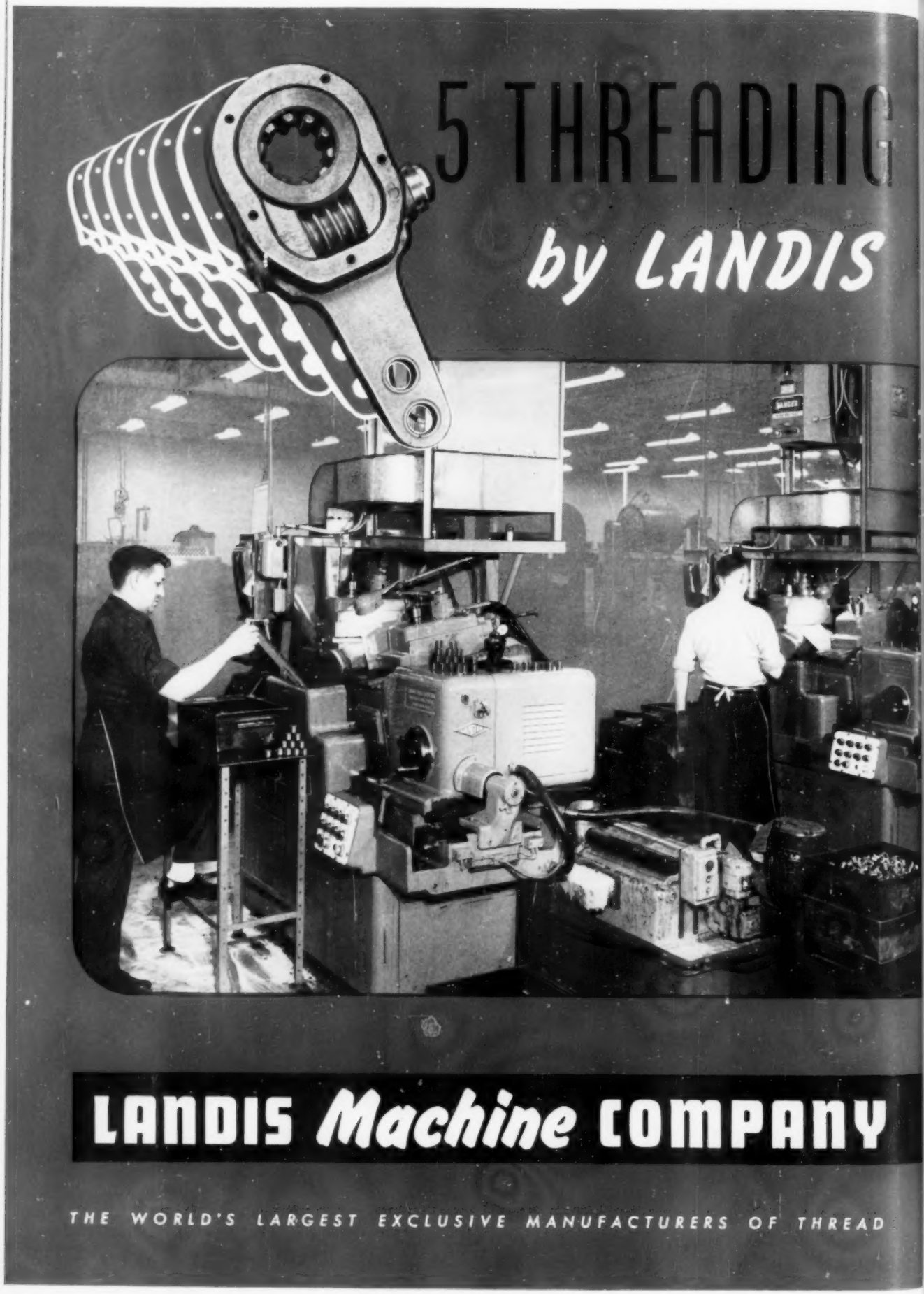
## YOU CAN—WHEN YOU HAVE CUTTING-EDGES LIKE THESE

**It's the cutting-edge that counts. Cutting tools today, as National designs and manufactures them, will produce more pieces at lower cost. National gives you the edge!**

**NATIONAL TWIST DRILL AND TOOL COMPANY**
Rochester, Mich., U.S.A.
Distributors in principal cities. Factory Branches: New York, Detroit, Chicago, Dallas, San Francisco

**CALL YOUR INDUSTRIAL SUPPLY DISTRIBUTOR**

. . . for all your staple industrial needs, including NATIONAL Twist Drills, Reamers, Counterbores, Milling Cutters, End Mills, Hobs, and Special Tools.

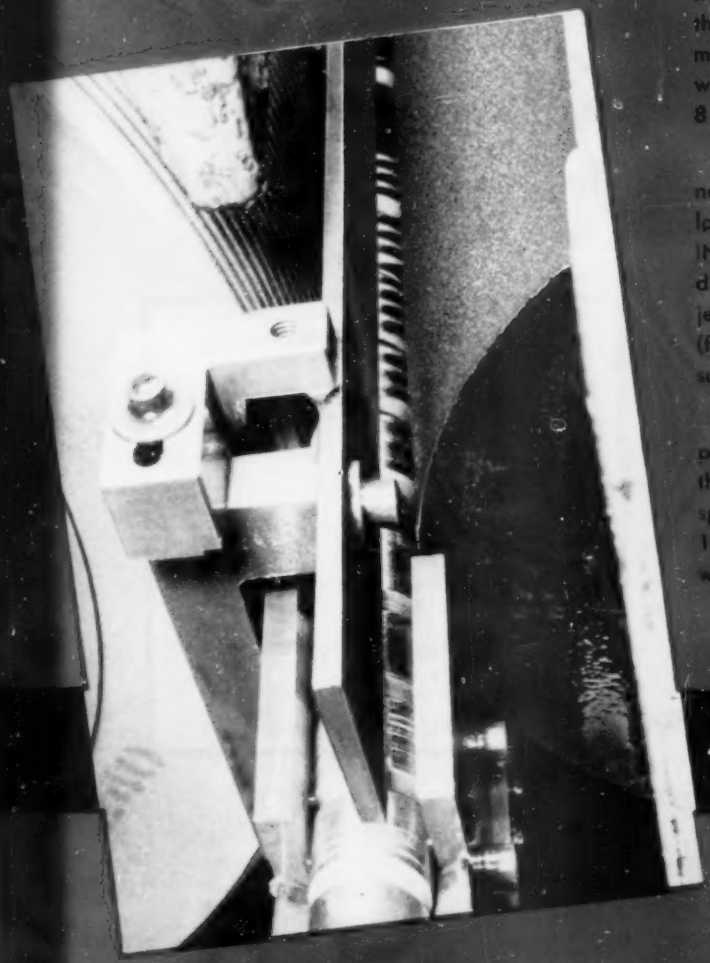

5 THREADING
by LANDIS
LANDIS Machine COMPANY
THE WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF THREAD

# PASSES ELIMINATED

## *Centerless Thread Grinders*

**BENDIX-WESTINGHOUSE in Elyria, Ohio, recently installed two *LANDIS* #1 Centerless Thread Grinders for threading slack adjuster gear worms used in automotive air brakes. This new threading method resulted immediately in fewer threading operations, fewer rejects, savings in critical materials, and longer product life.**

Gear worm blanks are made of alloy steel, heat-treated to a 285-311 Brinell hardness. Former methods had required 7 separate passes to complete the threads. Threads were rough-cut before heat-treating in one pass, then finish-ground in six passes after heat-treating.



Using the *LANDIS* Centerless Thread Grinders, threads are now completed after heat-treating in two operations. Both machines are arranged for "upgrinding", a method developed by *LANDIS*, which allows up to 30% greater work surface speeds while maintaining concentricity and finish. Upgrinding allows deeper cuts, and threads are finished in two passes. For example, on the machine producing 3½ pitch threads on 1¼" gear worms, roughing takes a .108" cut, finishing .089", with 8 pounds of metal removed every hour.

Other important advantages have resulted from the new process. By grinding threads after heat-treating, locked-in stresses are eliminated, and BENDIX-WESTINGHOUSE reports show that product life has been doubled. In addition, a reduction in the number of rejects and the elimination of a nubbing on the workpiece (formerly required to facilitate threading) has effected substantial savings of critical materials.

This successful production story can be retold in your plant. Centerless Thread Grinders, built exclusively in the United States by *LANDIS*, are designed for high-speed mass production of screw threads ranging from 1/16" to 4¾" in diameter. Please send specifications when writing for additional information.

LANDIS REG. U.S. PAT. OFF. TRADE MARK

**WAYNESBORO PENNSYLVANIA**

GENERATING EQUIPMENT

# *Nice work if you can do it...*

# and you can...

## with GISHOLT Turret Lathes..


*Gisholt 3L Saddle Type Turret Lathe—one of five sizes for heavy-duty work of all kinds*

## *Straight Machining... Angular Machining and Assembly...*

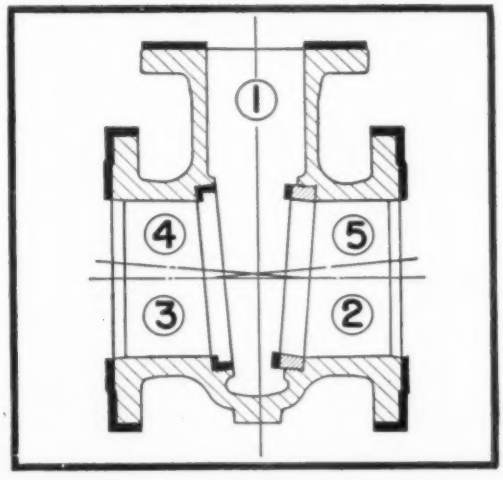
# all in one chucking!

Talk about time-cutting ideas, here's the versatility of a Gisholt 3L Saddle Type Turret Lathe paying off again.

All operations required to machine these gate valve bodies are done in a single chucking with a five-position indexing fixture. In addition to machining the bonnet and the two ends, the recesses for the two seat rings are bored and threaded at a five degree angle.

Then the seat rings are inserted—and tightly screwed in place with a driver mounted on the turret. The driving is done with a constant torque—adjustable to suit each job. The final operation is finish facing the seat ring after it is in place with the cross-feeding turret.

Gisholt Engineers have storehouses of ideas to help you increase your production. Ask one to call.




**GISHOLT MACHINE COMPANY**
*Madison 10, Wisconsin*


**THE GISHOLT ROUND TABLE** *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

**TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHI**

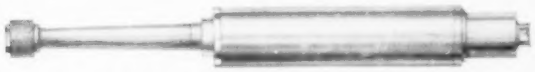
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-10

## It's the SPINDLE That Does The Work

on SURFACE GRINDERS

specify **POPE P32-T** Direct Motorized Cartridge Type with strong, oversize 1 HP, 3450 RPM totally enclosed motor.

**POPE**

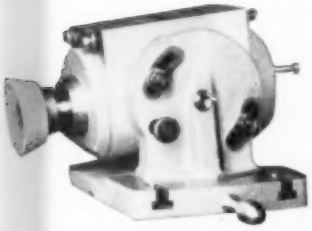


on INTERNAL GRINDERS

specify the NEW series of **POPE** belt driven, cartridge type Precision Internal Grinder Spindles, up to 54,000 RPM, with chrome plated, stationary cap in place of the old, revolving type.

It's the SPINDLE That Does The Work

on TOOL and CUTTER GRINDERS



specify **POPE P-6651-A** 3600-RPM Motorized Tool and Cutter Grinder Head with angular adjustment in a vertical plane.

POPE

on GRINDING, MILLING, BORING

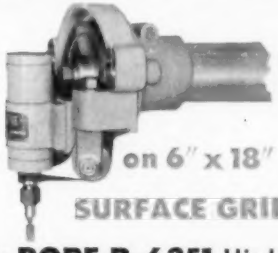
specify **POPE P-2500** Heavy Duty Direct Motorized Spindle for grinding, milling, boring —¾ to 100 HP.

It's the SPINDLE That Does The Work

on WHEEL HEADS

specify **POPE P-12004** Heavy Duty Vee-Belt Driven Machine Wheel Head for up to 4000 RPM—½ to 50 HP.

POPE



on 6″ x 18″ SURFACE GRINDERS

specify **POPE P-6351** High Speed Vertical Spindle Attachment for 6″ x 18″ Surface Grinders — 15,000 RPM.

It's the SPINDLE That Does The Work

★ *For complete specifications, prices and delivery estimates on these and the many other Precision Spindles on which the quantity and quality of a machine's production so largely depends, get in touch with*

No. 90

**POPE**

TRADE MARK REG. U.S. PAT. OFF.

**POPE MACHINERY CORPORATION**

ESTABLISHED 1920

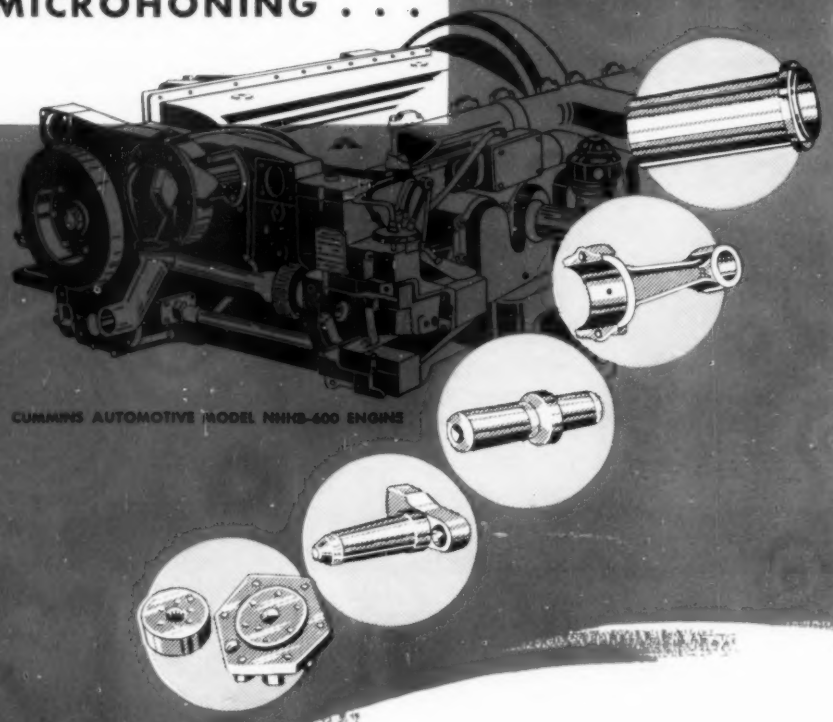
261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

INCREASED EFFICIENCY OF

# DIESEL ENGINES

THROUGH MICROHONING . . .



CUMMINS AUTOMOTIVE MODEL NHKB-600 ENGINE

PRECISION PRODUCTION THROUGH MICROHONING
MICRO MATIC

Diesel engines are chosen because of their dependable low cost power. The more precise the fit of parts, the more efficient the engine.

MICROHONING gives to functional surfaces of

- cylinder liners
- connecting rods
- valve guides
- injector barrels
- pump discs . . .

accurate size, true geometry, and the characterized finish—all at production rates.

For Information on MICROHONING of DIESEL ENGINE PARTS Write for *Cross Hatch*


MICROHONING – STOCK REMOVAL + GEOMETRY + SIZE CONTROL + SURFACE FINISH

**MICROMATIC HONE CORPORATION** • 8100 Schoolcraft, Detroit 4, Michigan

MICROMATIC HONE CORP.
MICRO-MOLD MFG. DIV
Boston Post Road
Guilford, Connecticut

MICROMATIC HONE CORP.
614 Empire Building
26 So. Main Street
Rockford, Illinois

MICROMATIC HONE CORP.
1539 Grande Vista Avenue
Los Angeles 23, California

MICROMATIC HONE LTD.
55 George Street
Brantford, Ontario, Canada

MICROMATIC HONE CORP.
MICRO-MOLD MFG. DIV.
231 So. Pendleton Avenue
Pendleton, Indiana

REPRESENTATIVES: Overgard Machine Tool Company, 234 Commonwealth Bldg., Denver 2, Colorado
Hallidie Machinery Co., 2726 First Ave., South, Seattle, Wash. • REPRESENTATIVES IN ALL PRINCIPAL COUNTRIES

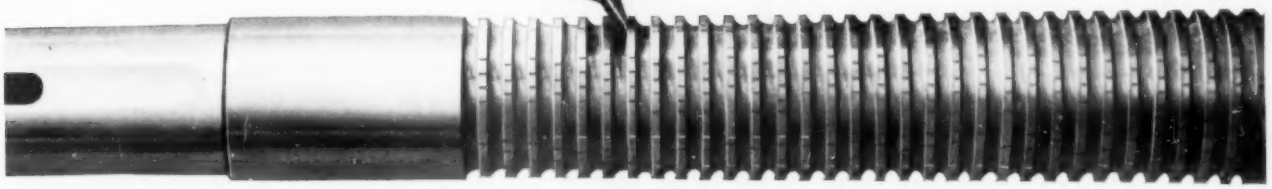
**SAVE WEEKS OF VALUABLE TIME!**
It's easy to SHARPEN all types and sizes of BROACHES with this

VERSATILE LAPOINTE

# UNIVERSAL BROACH SHARPENER

**Built with simplified "Touch-Controls",** it practically eliminates all need for skill in sharpening broaches. Any reasonably good tool man can do an expert job in no time at all!

*We design and build a complete line of standard and special broaching machines, tools and fixtures.*



**Available in 3 SIZES: 60", 72" and 80",** the LAPOINTE Universal BROACH SHARPENER occupies a surprisingly small floor area and will soon pay for itself *in time saved and money earned.* Attachments are available for backing-off.

*Ask us about the* **NEW 36" LAPOINTE Broach Sharpener** *designed especially for surface broaches. This sharpener has no head and tail stock, but uses a vise only. "Touch-Control" enables the operator to remove a minimum of stock, thus prolonging the life of the tool.*


*Every plant that owns a broaching machine needs the LAPOINTE Manual on Broach Sharpening.*

*Ask for Booklet BSM-5*

50 YEARS IN BROACHING!
We're the oldest in the world!
1902 • GOLDEN ANNIVERSARY • 1952

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
*Branch Factory: Watford, Herts., England*

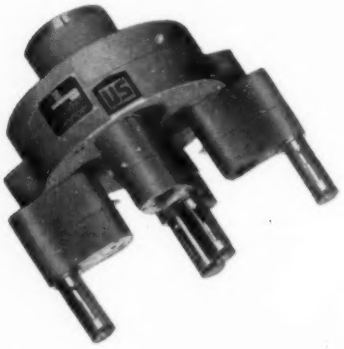
HUDSON LAPOINTE MASS

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

# ADJUSTAFIX

**A Name On Which To Rely**


## THE NEW DOUBLE ECCENTRIC ADJUSTABLE DRILL HEAD



Practically universal adjustment. 2 to 8 spindle, standard. Also specially designed heads.

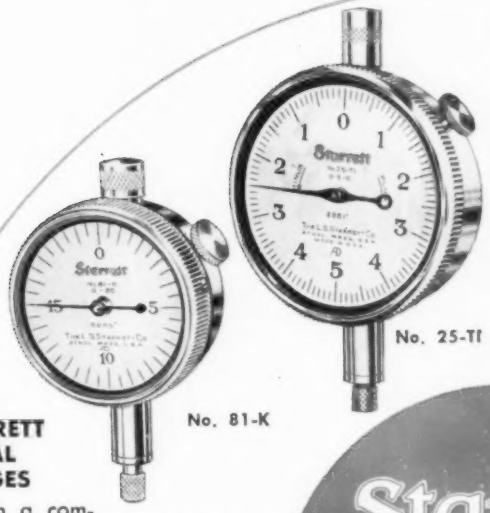
**Built for continuous use with full anti-friction bearing construction for high capacity thrust loads...precision-bored outboard spindle support plate.**

**UNITED STATES DRILL HEAD CO., CINCINNATI 4, OHIO**

*We manufacture all types of multiple spindle, fixed center and lead screw tapping heads*

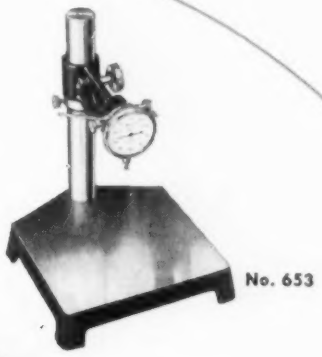
US HEADS
SINCE 1915

# MADE TO STARRETT STANDARDS OF ACCURACY AND PERFORMANCE




**STARRETT DIAL GAGES**

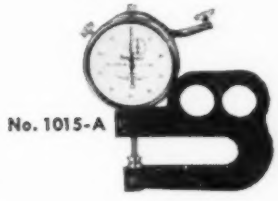
Made in a complete range of standard A.G.D. sizes and 54 types, with English or Metric graduations.




**STARRETT DIAL COMPARATOR No. 653**

With fine vertical adjustment. Base platen 9" x 9⅝". Vertical capacity 9¼". Throat depth 5". Indicator graduated .001".

# Starrett DIAL INDICATORS





**STARRETT PORTABLE DIAL HAND GAGES No. 1015-A and 1015-B**

½" and 1" thickness capacities; 2½" throat. Ideal for quickly measuring plywood, rubber, textiles, paper, metal parts, leather, veneer, fabrics, etc.


**STARRETT UNIVERAL DIAL BENCH GAGE No. 652**

With sliding table and fine adjustment. Capacity 1¾", throat depth 1⅝". Indicator graduated .0005".

**WRITE FOR YOUR COPIES**

DIAL INDICATOR CATALOG describes and illustrates the complete line with specifications and useful data . . . Address Department . . . E.

TRANSFER and DIMENSION CHARTS. Full scale details for quick tracing plus complete dimensions of all indicators and contact points.

STARRETT TOOLS

TRADE MARK
Starrett
REG. U.S. PAT. OFF.

SINCE 1880
WORLD'S GREATEST TOOLMAKERS

THE L. S. STARRETT COMPANY
Athol, Massachusetts, U. S. A.

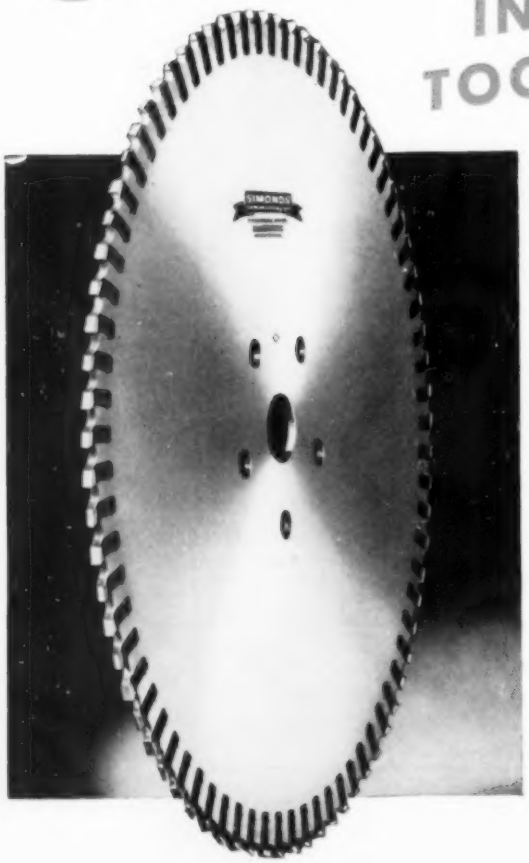
MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK
HACKSAWS, BAND SAWS and BAND KNIVES

Buy THROUGH YOUR INDUSTRIAL DISTRIBUTOR

*Prompt delivery*
*Dependable service*
*Quality products*

# A Wedge for every tooth means Added Strength for SIMONDS

## INSERTED-TOOTH SAWS



Here's the most rugged design of all metal-cutting saws . . . the tough saw-plate of special Simonds Steel, fitted with alternating square and beveled inserted teeth . . . *and with a wedge for every tooth*, to give that extra strength for heavy cutting. In fact, this saw is practically indestructible, for it can be readily repaired if damaged and restored to original efficiency by an average mechanic.

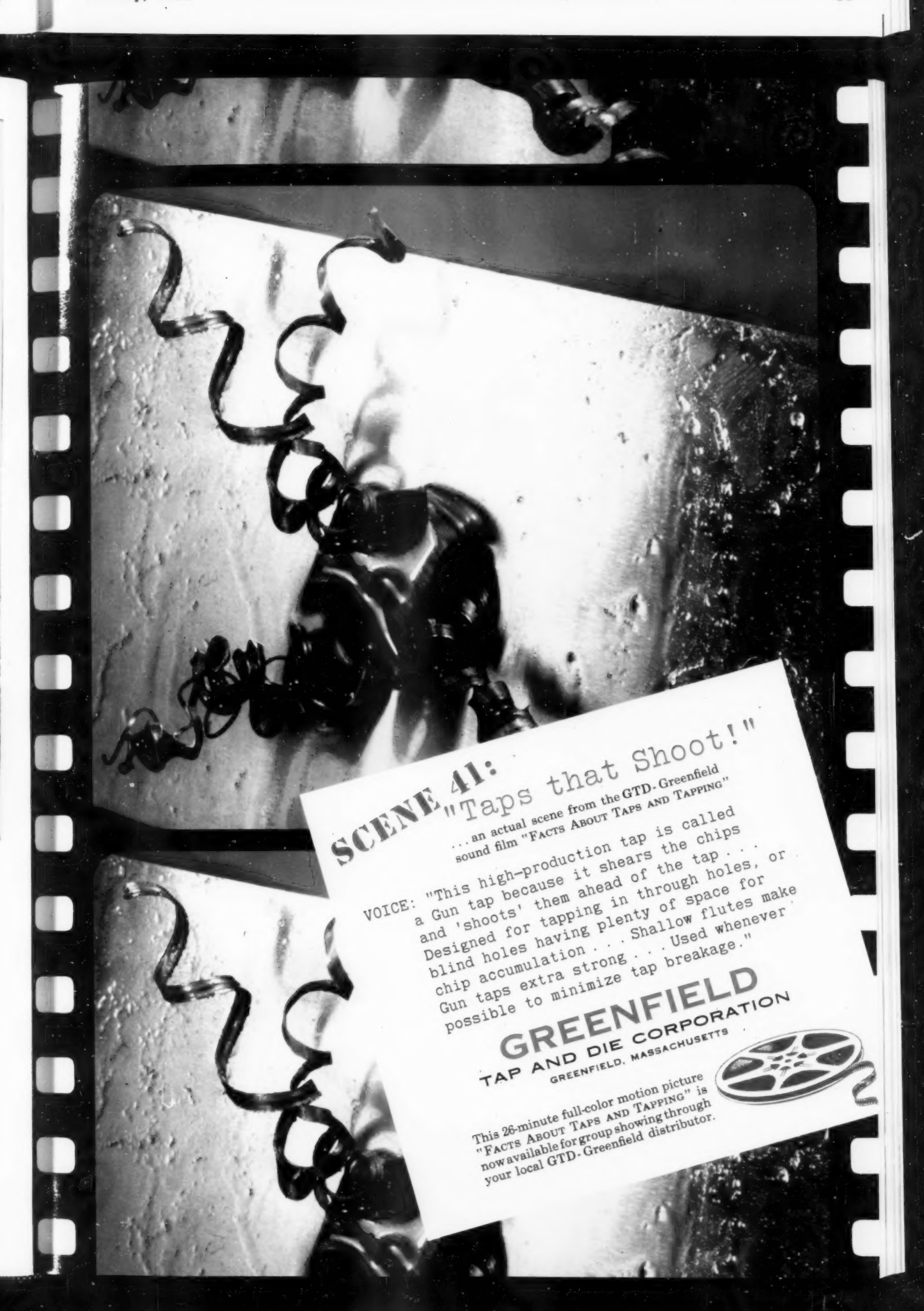
Yet Simonds Inserted-Tooth Saws have the same quick clearance as other Simonds Saws . . . and the inserted teeth cut a "Tri-vided" chip that falls free in 3 pieces.

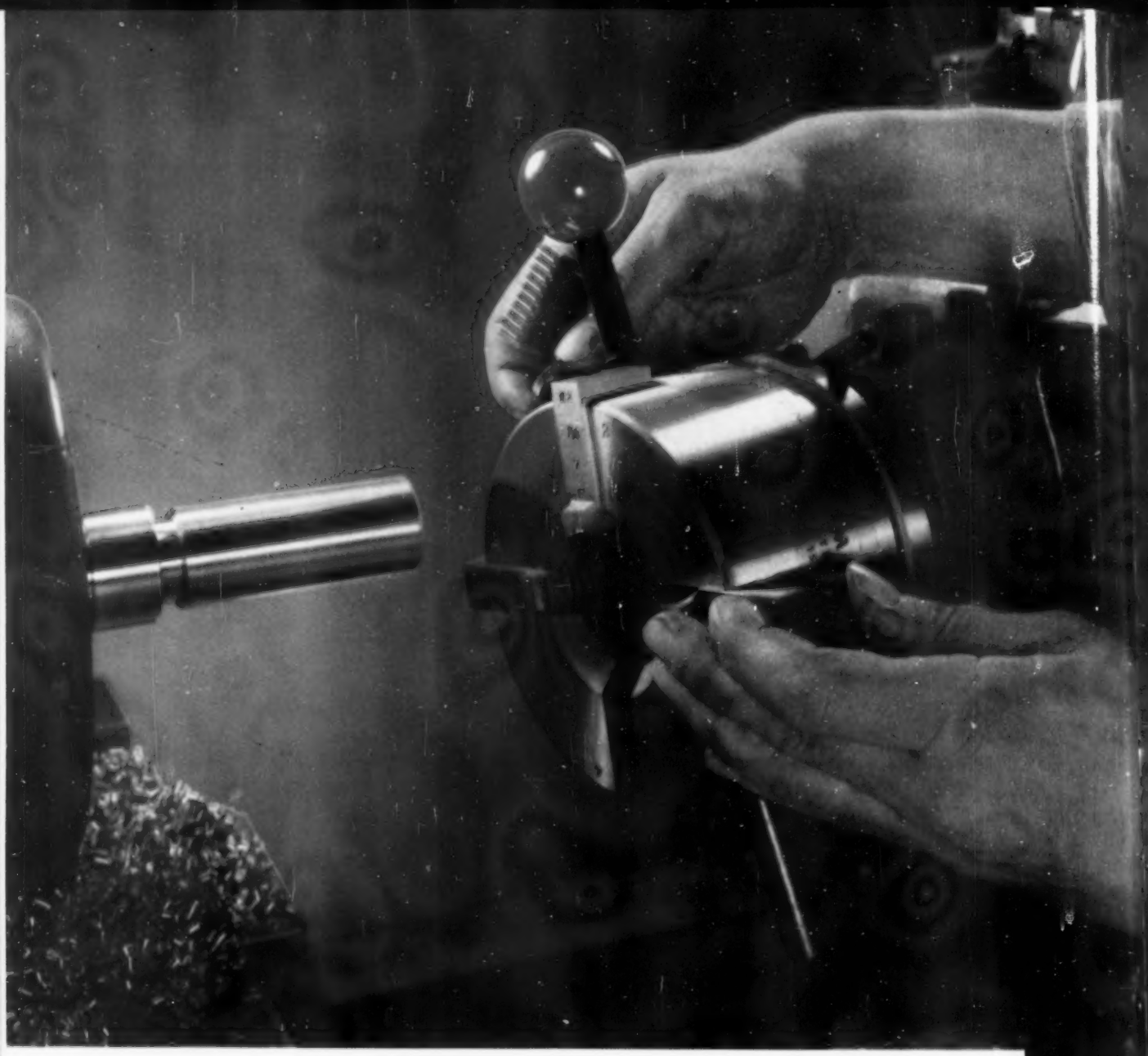
For general heavy-duty work, this is *Industry's No. 1 Saw.* And for other types of work, Simonds also makes Circular Metal Saws in Segmental, Solid-Tooth and Carbide-Tipped types. So ask your Industrial Supply Distributor to secure for you the *unbiased* consulting of a Simonds Saw Engineer.

**SIMONDS SAW AND STEEL CO.**

**FITCHBURG, MASS.**

*Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon*
*Canadian Factory in Montreal, Que.*
*Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada*


SCENE 41:
"Taps that Shoot!"
... an actual scene from the GTD-Greenfield sound film "FACTS ABOUT TAPS AND TAPPING"
VOICE: "This high-production tap is called a Gun tap because it shears the chips and 'shoots' them ahead of the tap . . . Designed for tapping in through holes, or blind holes having plenty of space for chip accumulation . . . Shallow flutes make Gun taps extra strong . . . Used whenever possible to minimize tap breakage."
GREENFIELD
TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS
This 26-minute full-color motion picture "FACTS ABOUT TAPS AND TAPPING" is now available for group showing through your local GTD-Greenfield distributor.



# CHASERS IN OR OUT IN SECONDS

**Quick chaser insertion and removal means less down time on threading jobs, and it's a big feature of GEOMETRIC "D" type Die Heads.**

**Just pull up a stop plunger and snap the chasers in or out of their slots in less time than it takes to tell how. No face plate to remove, no screws to replace, no parts to adjust.**

**Simple to operate, rugged, precision built. That's the GEOMETRIC "D", industry's BASIC DIE HEAD, the one to which all others are compared.**

*Write for full details. Specify Bulletin D*

*Greenfield Tap and Die Corporation*

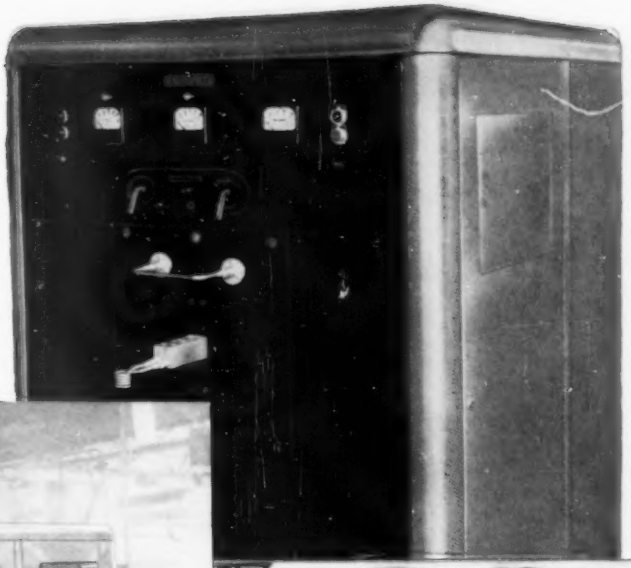
**GEOMETRIC TOOL COMPANY DIVISION**

**NEW HAVEN 15, CONNECTICUT**

GEO MET RIC

AT WENDT-SONIS

# A LINDBERG INDUCTION HEATING UNIT




## ups tool tip brazing 135% . . . replaces two units

Production brazing of carbide tip tools has soared from 270 to more than 600 an hour since Wendt-Sonis, Hannibal, Mo., tool manufacturer, installed a Lindberg induction heating unit.

Two operators, fluxing parts and putting brazing metal and carbide tool tips in place, load the assemblies on a conveyor belt that passes a continuous stream of work through a specially designed, long hair-pin type heating coil.

Production is speeded because 14 tool assemblies . . . not just one . . . are in the heating field at any given time. The first tool on the conveyor passes *from* the heating area, leaving 13 others *still in* the field of heat, with tool number 15 *just entering* the coil area.

Production, formerly through two smaller units, totalled only 135 tools per hour, per unit, and required four operators. Thus the new equipment frees two operators for other important work.

If your requirements call for production brazing, soldering, hardening, annealing, stress relieving, hot forming, forging or shrink fitting, a Lindberg induction heating unit can better your production picture . . . minimize costs . . . increase profits.


**Ask for a copy of Bulletin 1440. It pictures and describes standard models . . . illustrates 11 cost reducing features . . . lists applications . . . shows accessory equipment.**

**LINDBERG** HIGH FREQUENCY DIVISION

**Lindberg Engineering Company, 2447 West Hubbard Street, Chicago 12, Illinois**

## In grinding . . .

# *you get the most from Norton*

## because Norton has the most to offer you

Only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower costs.

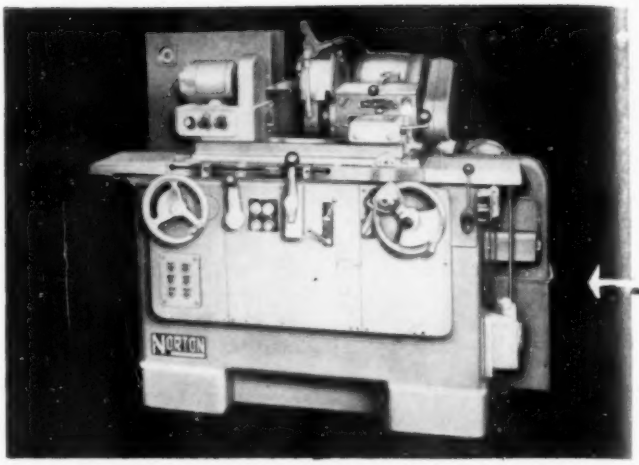
Take advantage of this experience. Discuss with us your present grinding problems or your post-emergency production to fit tentative delivery schedules into your future plans.

*To Economize Modernize With* **NEW**

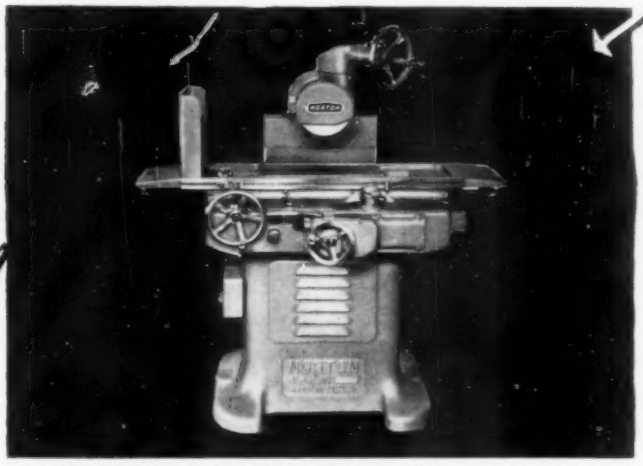
**NORTON**

**GRINDERS *and* LAPPERS**

*Making better products to make other products better*




**NEW NORTON 4″ TYPE CTU** Semiautomatic, in 12″ and 18″ work-length capacities, rounds out the Norton Cylindrical Grinder Line. Like the larger 6″ and 10″ CTU's, it offers you a unique combination of speed, accuracy, flexibility and sturdiness. All Norton CTU Semiautomatics have "one lever" control of automatic time cycle which reduces operator attention merely to loading and unloading. *Catalog No. 531* gives you all details.

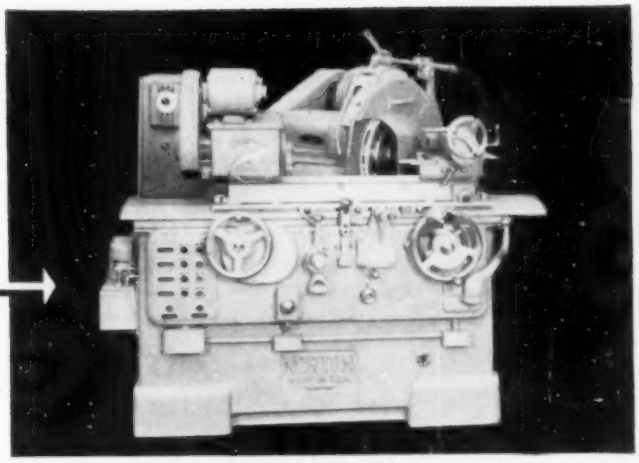


**NORTON HYDRAULIC SURFACE GRINDERS,** designed with both hand and hydraulic table traverse and cross feed, produce plane surfaces smoothly and speedily. Convenient controls and easy accessibility keep operating and maintenance time low. Such extras as a permanent magnet or direct current type chuck, wet grinding attachment or individual dust exhaust system help make a good basic machine better. Three sizes: 6″, 8″, and 10″. *Write for Catalogs 954 (6″); 190 (8″) and 1745 (10″).*

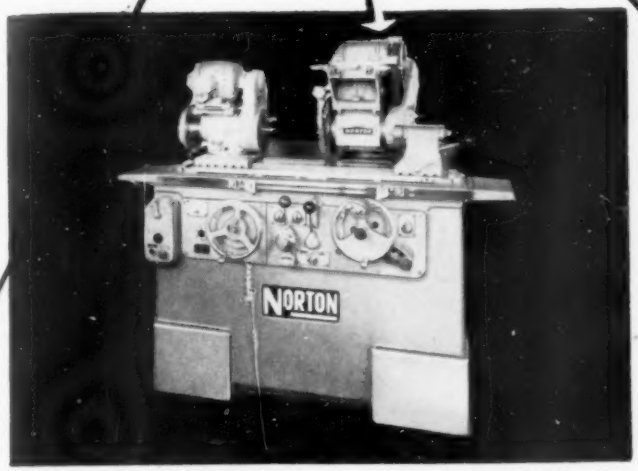
**NORTON TYPE 16FC VERTICAL LAPPER** produces either flat or cylindrical work to a high degree of dimensional accuracy, parallelism and finish. Widely used for such work as diesel injector parts, plug gages, size blocks, sides of small bearing races, pump gears and plates and other parts. Other Norton lappers are available. *Write for Catalog 212 and General Catalog 1843.*

# Norton Grinders and Lappers

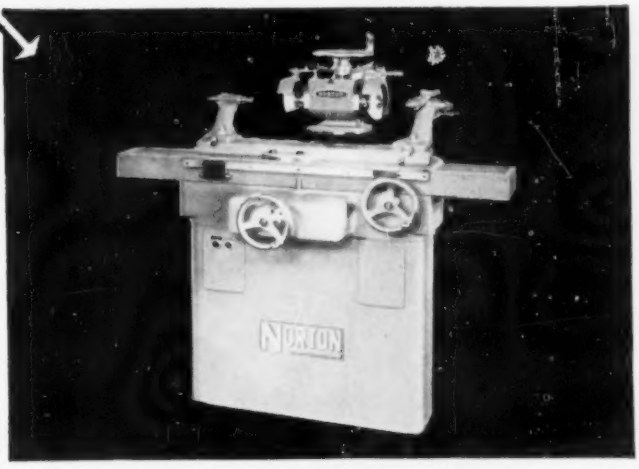
*The world's most complete line*



**NORTON ANGULAR WHEELSLIDE GRINDERS** are semiautomatic machines which simultaneously grind thrust surfaces and adjacent diameters to finest accuracy and finish. By eliminating the need for an extra operation, they cut over-all production costs. "One lever" control of automatic time cycle, as in CTU's, helps operators produce more with less effort. Two sizes: 6"x18" and 10"x36". *Catalogs No. 533 (6"x18") and 1793 (10"x36")* give you more information.




**NORTON UNIVERSAL GRINDERS** are so flexible they handle almost an endless variety of jobs. Compound swivel arrangement allows you to set and feed the wheel at any angle. External, internal, face or angular wheelslide operations come easy with Norton Universal Grinders. Four sizes: 10"x20" and 12", 14", or 16", each with work length capacities of 36", 48", or 72". *Write for Catalogs 170 (10"x20") and 1668 (12", 14", 16").*




**NORTON NO. 20 CUTTER AND TOOL GRINDER,** with its tilting wheel head, is the most versatile machine in its class. Wheel head tilts 15° above or below horizontal . . . may be swivelled 360° in a horizontal plane. Integral motor cartridge type spindle, duplicate controls for front or either-side operation are other features that make this machine first choice for toolroom grinding. *Write for Catalog 189.*

**ONLY NORTON OFFERS YOU OVER 50 YEARS OF COMBINED EXPERIENCE IN:**

**Abrasives and Grinding Wheels**

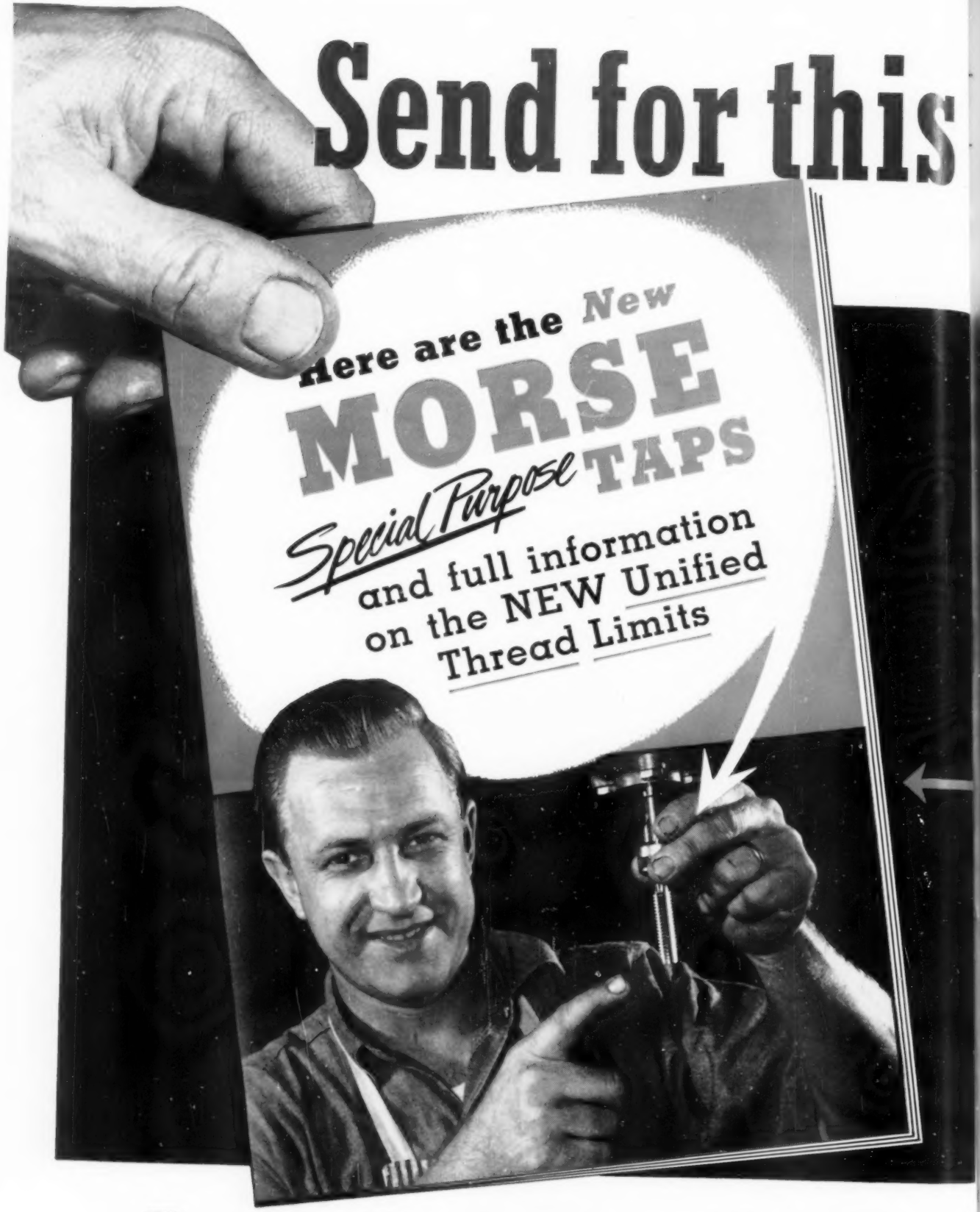
**Machines for** Cylindrical Grinding • Surface Grinding • Cylindrical and Flat Lapping • Universal Tool and Cutter Grinding • Universal Multipurpose Grinding • Specialized Grinding • Crankshaft Grinding • Cam Shaft and Contour Grinding • Roll Grinding.

**NORTON COMPANY • MACHINE DIVISION • WORCESTER 6, MASS.**

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit

In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

# Send for this




MORSE

# NEW BOOK Now...


Here's the *"book of the year"* for tap-users who want performance beyond anything they have known before . . . in cast iron or brass . . . in aluminum or stainless steel . . . and in non-ferrous materials with abrasive or shrinkable characteristics.

This handy, 12-page pocket-book gives complete specifications on the new line of Morse Special-Purpose Taps . . . and shows how they differ from Morse General-Purpose Taps in either rake or hook angle, or pitch diameter. What's more, you get the whole story, in 2 quick pages, on the new Unified Thread Limits.

**First Edition Now on the Press . . . Write Dept. TE -1 and Reserve Your Copy NOW!**

**MORSE TWIST DRILL & MACHINE COMPANY**
NEW BEDFORD, MASS.
*(Division of VAN NORMAN CO.)*
*Warehouses in New York, Chicago, Detroit, Houston, San Francisco*

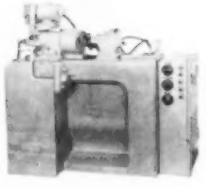
# Cutting Tools

**. . . buy them by phone from your Morse-Franchised Distributor and save ordering time.**

# bryant
## internal grinding

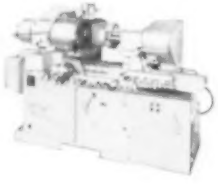
### no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6″. Max. grinding length, 3½″.



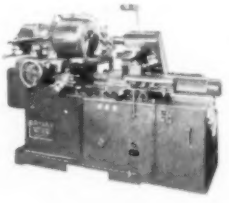
### no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6″. Max. grinding length, 3½″.



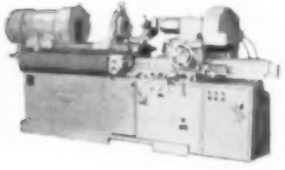
### no. 1316

Two wheelheads for high production of jobs requiring face and bore, or face and O.D. grinding. Max. traverse stroke, 20″. Max. grinding length, 8″.



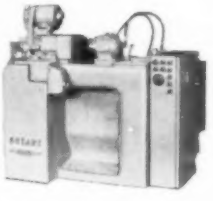
### no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20″. Maximum grinding length, 8″.



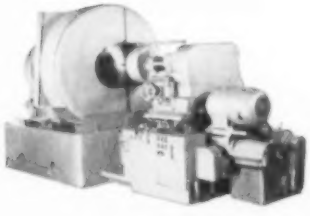
### no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20″. Maximum grinding length, 8″.



### no. 1209

A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6″. Max. grinding length, 3″.

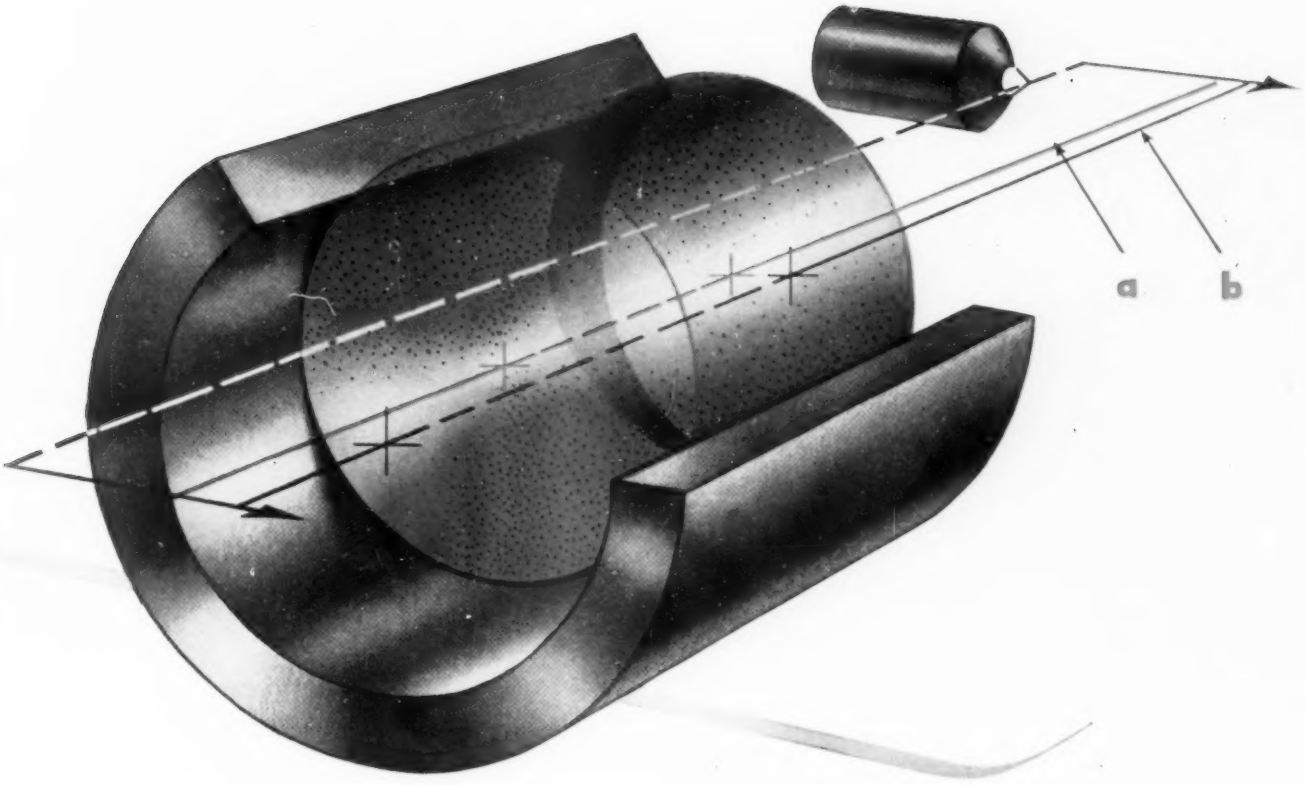


### no. 1460

For production or single piece hole grinding on parts up to 60″ diameter. Max. traverse stroke, 21″. Max. grinding length, 16″.

### no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6″. Max. grinding length, ¾″.




THE heart of the internal grinding process is the line of contact between the wheel and the work. This contact line must be straight for the full length of the wheel and the full length of work as the wheel traverses. If the contact is not a straight line, the internal grinder is "out of line". Improper alignment may show up in the work as incorrect hole geometry (bell-mouth or taper) and poor surface finish. In addition, excessive wheel wear and poor wheel action may result.

Several elements contribute to the straightness of this line of contact: first, the path along which the wheel is traversed "a" must be a straight line; second, the axis of the wheel must lie in a plane parallel to the wheel path "a", and third, the axis of the work "b" must be parallel to the wheel path "a". For production grinding, the diamond must lie in the plane established by the wheel axis and the work axis.

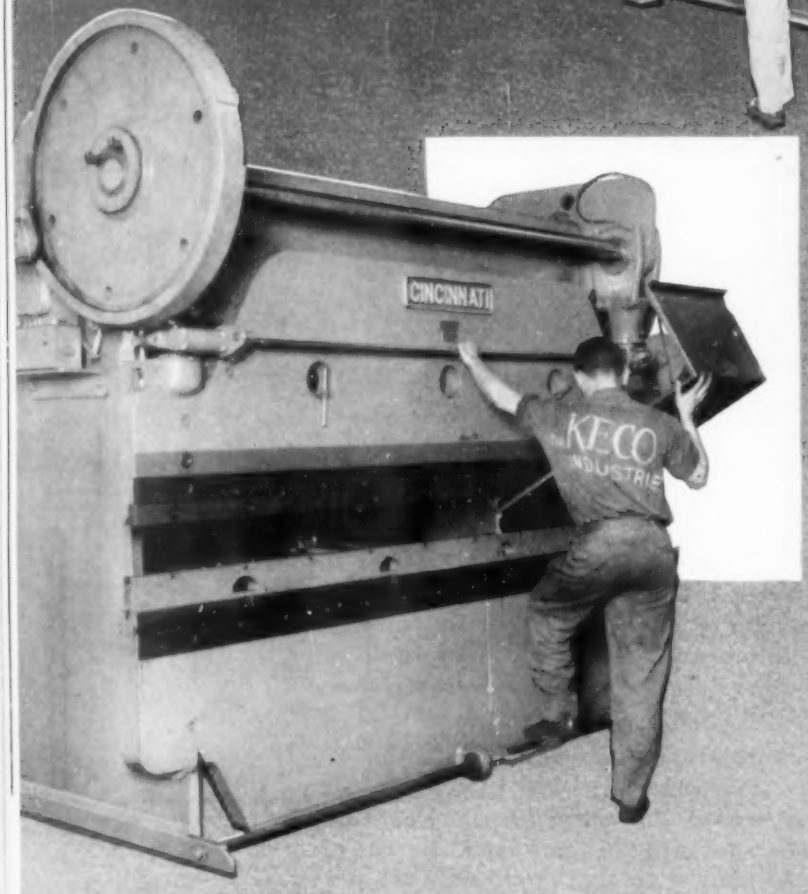
Perfect alignment means that the slides must be straight and true, the wheel and work spindles must be in line and "zeroed" for center heights and the diamond must be on "dead center" of the wheel. A full, straight line of contact will extend wheel life, improve wheel action, and will assure correct geometry and required finish.

## Bryant Chucking Grinder Company

**Springfield, Vermont, U. S. A.**

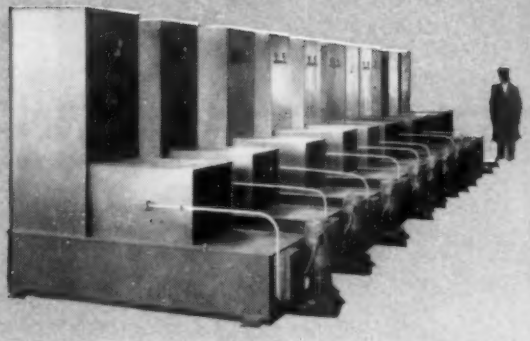
*Internal grinders • Internal & External thread gages*

# 3 times as fast...


# with this CINCINNATI team

*Photographs courtesy of the Keco Industries, Cincinnati 25, Ohio*



Cooling towers for portable air conditioning units

The floor-to-floor time consumed in shearing and forming panels for air-conditioning units, was cut from 12 minutes to 4 minutes at Keco Industries, using a Cincinnati Brake and a Cincinnati Shear.

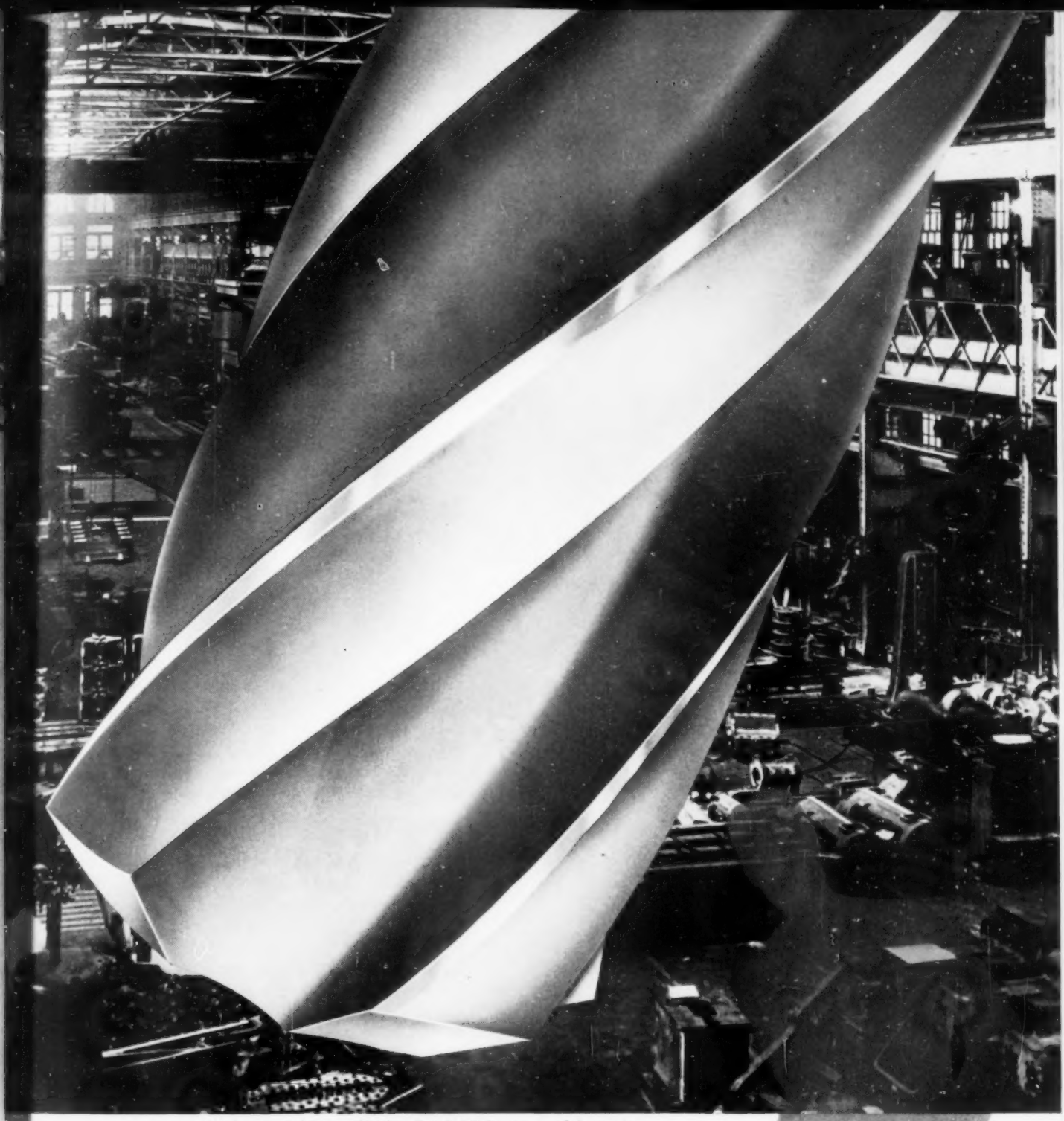
Accuracy and rapid handling effected these savings.

In your shop, there may be opportunity for real costs reductions. Investigate Cincinnati Shears and Cincinnati Press Brakes.

Write for Cincinnati Shear Catalog S-6 and Cincinnati Brake Catalog B-3.

**THE CINCINNATI SHAPER CO.**

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES



This is a special Union 4¼" four-fluted drill for core work in cast iron.

**WHATEVER YOUR DRILLING JOB...** large or small . . . there's a UNION twist drill that's *right* for your material and *right* for your drilling equipment. Let your Union Distributor help you choose it . . . and you'll be sure of fast, free-cutting performance, less chance of breakage and more work between resharpenings. So, put the "first team in drilling" to work for you . . . today.

**FIRST TEAM IN CUTTING TOOLS . . .**

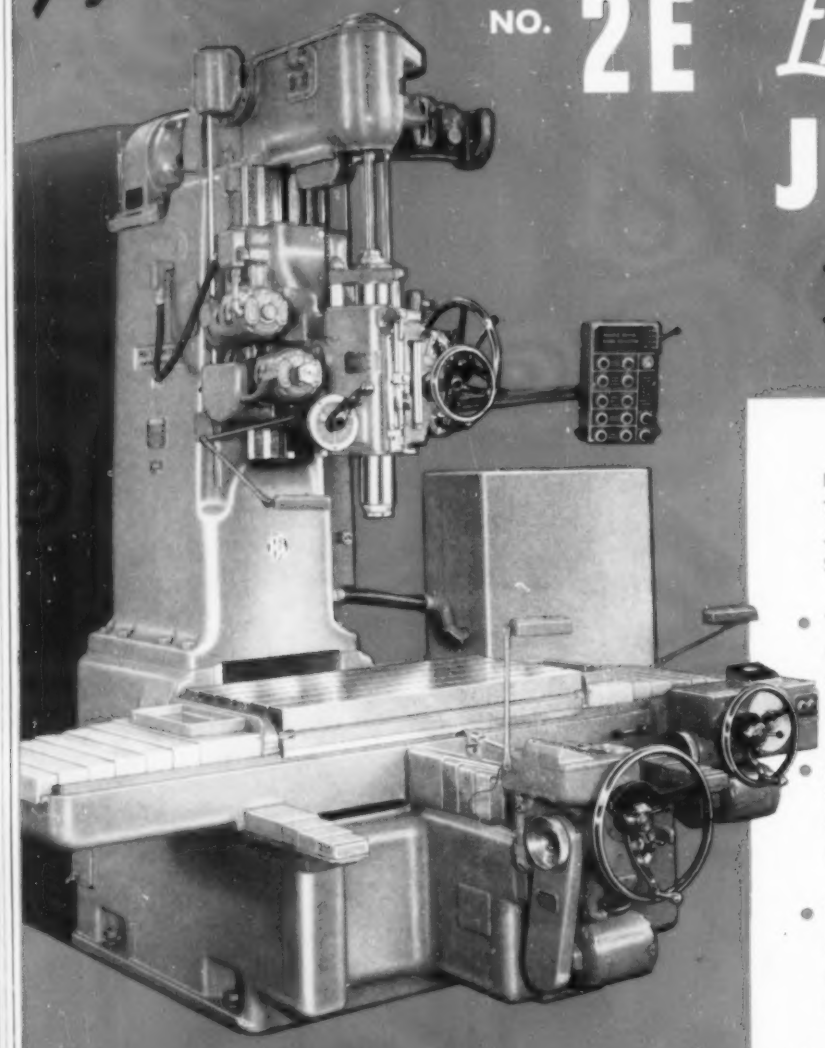
# UNION and your Local Distributor

**UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS** • Milling Cutters • Gear Cutters • Twist Drills • Hobs • Reamers • Carbide Tools

We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass., Taps, Dies, Screw Plates . . . BUTTERFIELD DIVISION, Derby Line, Vt., Taps, Dies, Screw Plates, Reamers, Twist Drills . . . BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates

# NOW THE NEW NO. 2E PRATT & WHITNEY *Electrolimit* JIG BORER

## THE PRACTICAL SIZE FOR THE AVERAGE TOOL ROOM



There is no better Jig Borer available anywhere at any price than this new Pratt & Whitney Number 2E. As a result of the knowledge gained in producing the 1E and 4E Jig Borers, it incorporates every detail of job-proved advanced design features, metallurgical control, manufacture and inspection that can contribute to fast, accurate performance and convenient operation. This outstanding machine tool brings you the full benefit of Pratt & Whitney's research facilities, modern production equipment, honest craftsmanship and experience from nearly a century of successfully serving industry throughout the world.

Wherever high-precision work must be produced rapidly and dependably day after day, the Pratt & Whitney 2E Jig Borer is the first choice to meet your needs best.

BRINGING THESE OUTSTANDING ADVANTAGES OF THE PRATT & WHITNEY SERIES "E" *ELECTROLIMIT* JIG BORERS TO YOUR MANY SMALL AND MEDIUM SIZED, HIGH-PRECISION JOBS

- THE NEW P&W *Electrolimit* MEASURING SYSTEM

  This entirely new method of locating the table is extremely fast, accurate and easy to use. Wear is eliminated and the high original precision is retained indefinitely.

- EXCLUSIVE PRECISION PRELOADED BALL ROLL QUILL

  The hardened, ground and lapped spindle quill "roll-feeds" in a preloaded ball roll mounting. Accuracy to "tenths" is assured indefinitely without maintenance or adjustment.

- P&W OPEN SIDE CONSTRUCTION

  Large, irregular shaped work pieces are handled with a convenience and speed impossible with any other type of jig borer construction.

- AMPLE CAPACITY

  Table working surface is 22" x 44", longitudinal travel 36" and transverse travel 22". Table top to spindle end, maximum, is 27"; special columns 6" and 10" higher than standard can also be supplied.

**PRATT & WHITNEY *End Measure* JIG BORERS**
Pratt & Whitney will continue to manufacture its famous line of Jig Borers equipped with End Measures, featuring the same high precision construction and performance as the Series "E", but without the *Electrolimit* Measuring System.

## *Other* PRATT & WHITNEY *Electrolimit* JIG BORERS

**NOW IN PRODUCTION:**

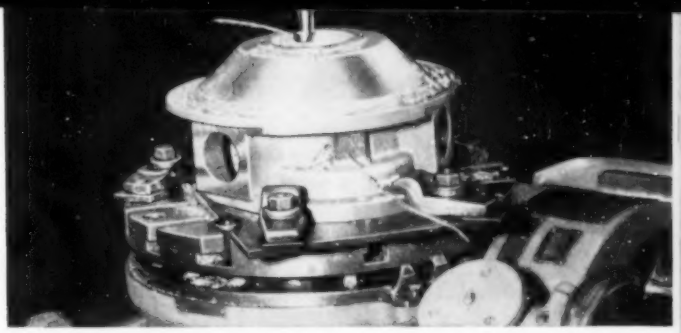
THE 1E — Compact and versatile with table sizes of 12" x 24" and 12" x 42".

THE 4E — Largest precision jig borer built with 36" x 72" rectangular table or combination rectangular and built-in 48" rotary table.

**AND ON THE WAY:**

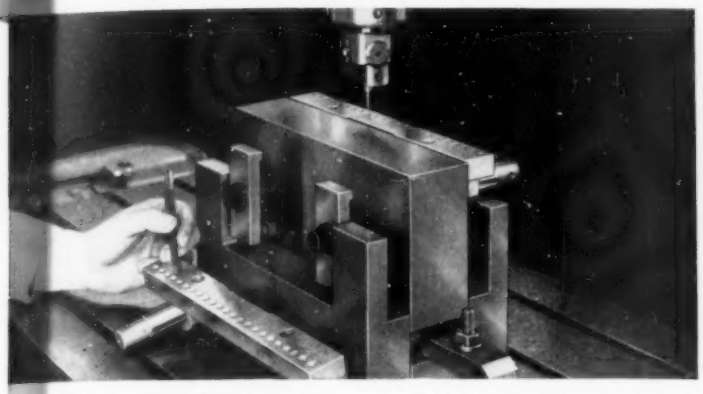
THE 3E — Intermediate capacity with a 28" x 56" table.

Machining of components for this big die, 48" square, is handled with a P&W 30" Rotary Table on a Pratt & Whitney Jig Borer. A total of 160 holes on the die ring and punch pad are drilled and bored to a tolerance of ±.0001" making possible a uniform fit in any combination of assembly.

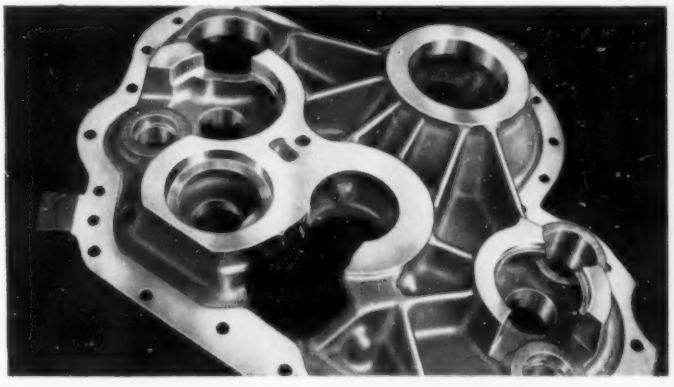


Here a casting is precision machined on a P&W Jig Borer with a P&W Tilting Rotary Table. Using only ordinary hold-down clamps, 13 holes are bored, 2 surfaces faced and 3 more surfaces precision milled *in a single setup*. No special fixtures are required.

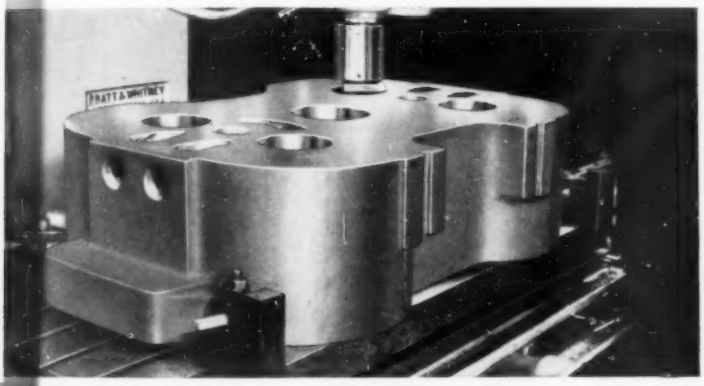
## OU CAN PUT *Performance like this* TO WORK IN *Your Plant*



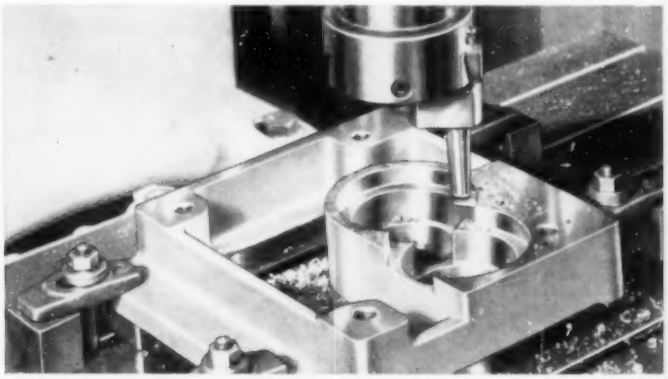
One of these punch and die bars requires 23 holes .1875" in diameter; the other requires 23 holes .3120" in diameter. Using a P&W Jig Borer, they are all single point bored to a tolerance of +.0000", —.0002"; center distances of .5000", ±.0002" and a permissible accumulated error of only ±.0005"



Extreme, dependable accuracy is a "must" in the Aviation Industry. That's why a Pratt & Whitney Jig Borer is used to machine the aluminum alloy aircraft engine part to "tenths" limits. Operations include drilling, boring, facing and precision milling.




Machining this big Meehanite casting for a hydraulic pump, calls for five holes approximately 5" in diameter, precision bored to a tolerance of .0005" for spacing and hole size. A Pratt & Whitney Jig Borer does the job rapidly, dependably, economically.



Shown here is a single point boring operation on one of the four overlapping holes in a machine gear box adapter. The four diameters in each of these two bearing seats are precision bored to a tolerance of .0005" using a Pratt & Whitney Jig Borer.

Write on your Company letterhead for Cir. No. 559.

**PRATT & WHITNEY**

DIVISION NILES-BEMENT-POND COMPANY

**WEST HARTFORD 1, CONNECTICUT, U. S. A.**

*First Choice* P&W *for Accuracy*

BRANCH OFFICES . . . BIRMINGHAM • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DALLAS (The Stanco Co.) • DETROIT • HOUSTON (The Stanco Co.)
LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD

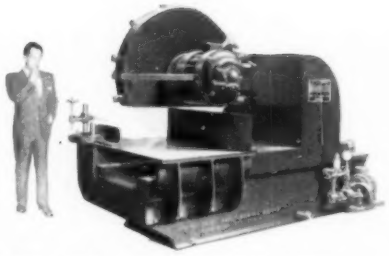
MACHINE TOOLS • CUTTING TOOLS • GAGES

## World-Wide Experience in Thousands of Plants Proves

# Kling is a profitable investment in SPEED!

Kling Machines are speeding production and cutting costs for thousands of manufacturers all over the world. Let us show you how Kling Machines can help you produce faster, easier, better, at lower cost. Benefit by Kling's engineering experience of over a half-century; consult us, without cost. **Send for Bulletins** on the machines in which you are interested—**Kling Bros. Engineering Works • 1321 North Kostner Avenue • Chicago 51, Illinois, U. S. A.**

*Manufacturers of Plate Bending Rolls . . . Punches . . . Combination Shear, Punch & Copers . . . Double Angle Shears . . . Rotary Shears . . . Bulldozers . . . Bar Benders . . . Beam Benders . . . Combined Punch & Beam Benders . . . Punches—Horizontal, Vertical & Beam Types . . . Angle Bending Rolls . . . Guillotine Type Bar Shears.*

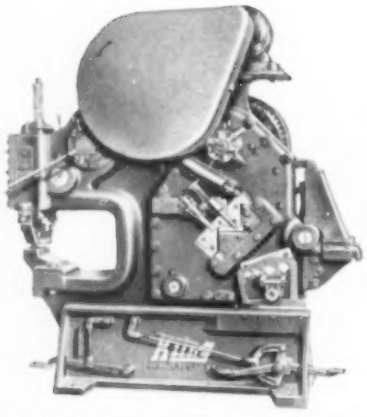


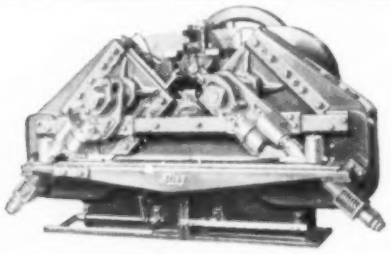
### KLING HIGH SPEED FRICTION SAWS

*. . . enable you to do the job faster*

Cut time required for cutting beams, channels, rails, angles, squares, rounds or tubes. No set-up changes needed to cut any sequence of structural shapes. Takes place of several separate shears or slow speed saws. Cut alloy steels, too, in record time.

*Send for free Bulletin No. 9200*





### KLING DOUBLE ANGLE SHEARS

*. . . 2 Shears in 1 machine*

This high-production machine can give you more and cleaner cuts on many different shearing operations. For instance you can simultaneously shear round bars and bar angles on left side and structural angles and flat bars on the right. Automatic hold-downs as well as automatic lubrication are available.

*Send for free Bulletin No. 2345*

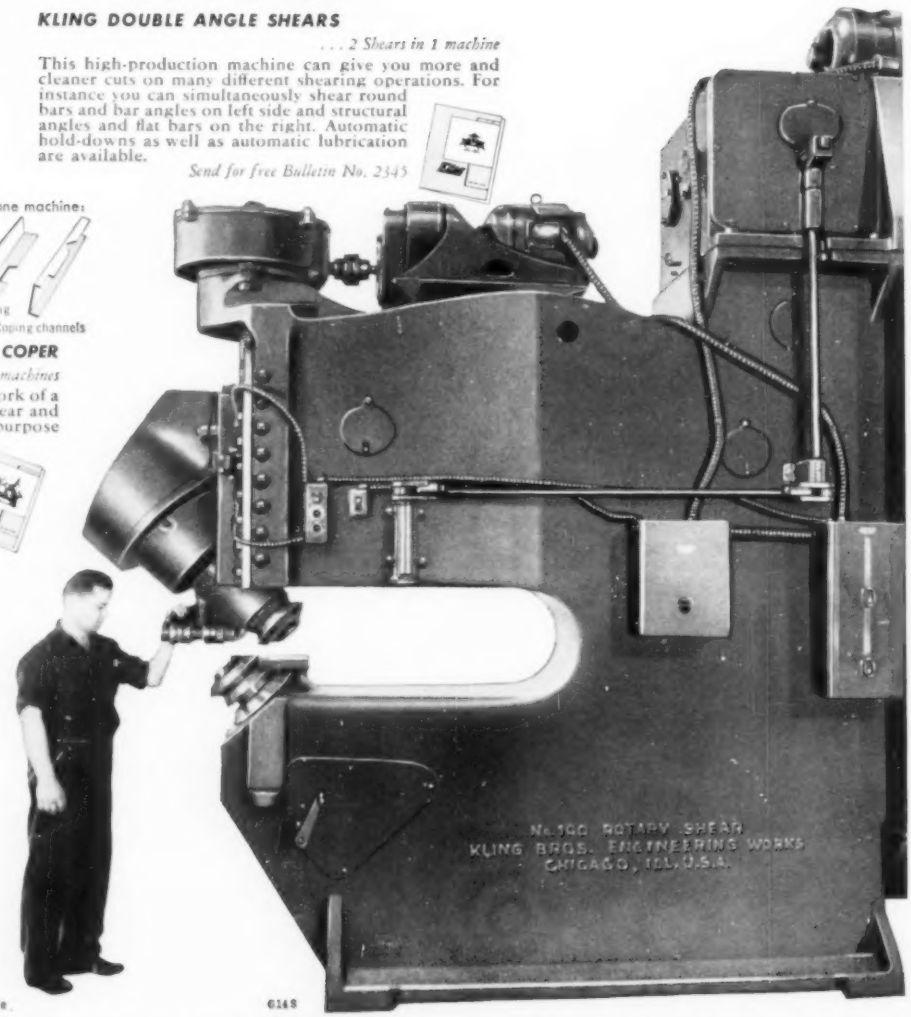
Seven typical jobs, seven different operations on this one machine:


### KLING COMBINATION SHEAR, PUNCH AND COPER

*. . . does the work of many machines*

One of these Kling Machines can turn out the work of a separate punch, angle shear, bar shear, plate shear and notcher—yet it costs little more than a single-purpose punch. For speed and safety, each end operates independently. Foot pedals allow both operators to keep hands free to hold work. Available for light, medium or heavy work.

*Send for free Bulletin No. 347*



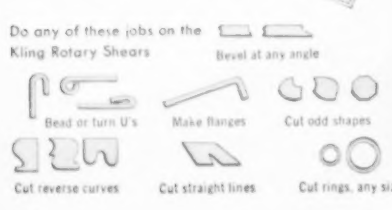

### KLING ROTARY SHEARS

*. . . save time . . . improve accuracy . . . cut costs*

Get hair-line precision as well as speed, in sheet and plate cutting, whether you do one or many of the operations shown. One Kling Shear will often eliminate the need of several old-style shears or other equipment. Many attachments available. A wide range of types and sizes to meet your specific requirements, up to a rated capacity to shear 1" thick mild steel.

*Send for free Bulletin No. 245A.*

Do any of these jobs on the Kling Rotary Shears




6165

ACHINE TOOLS • CUTTING TOOLS • GAGES

**Officers**

L. B. Bellamy
Detroit, Mich.
*President*

Roger F. Waindle
Muskegon, Mich.
*First Vice-President*

Joseph P. Crosby
Lexington, Mass.
*Second Vice-President*

H. B. Osborn, Jr.
Cleveland, Ohio
*Third Vice-President*

H. E. Collins
Houston, Texas
*Secretary*

H. C. McMillen
Bedford, Ind.
*Treasurer*

Gerald A. Rogers
Montreal, Quebec
*Assistant Secretary-Treasurer*

H. E. Conrad
Detroit, Mich.
*Executive Secretary*

**Board of Directors**

L. B. Bellamy,
Chairman
Detroit, Mich.

J. J. Demuth,
St. Louis, Mo.

T. J. Donovan, Jr.,
Philadelphia, Pa.

W. G. Ehrhardt,
St. Louis, Mo.

G. A. Goodwin
Dayton, Ohio

Ben J. Hazewinkel,
South Gate, Calif.

W. B. McClellan,
Detroit, Mich.

H. B. Osborn, Jr.,
Cleveland, Ohio

G. A. Rogers,
Montreal, Quebec

F. J. Schmitt,
Chicago, Ill.

R. F. Waindle,
Muskegon, Mich.

**Editorial Committee**

Wayne Kay, Chairman
East Detroit, Mich.

Edward W. Dickett
Rockford, Ill.

Lee Murray Davis
Springfield, Vt.

Louis W. Greenblatt
St. Louis, Mo.

Joseph L. Petz
Poughkeepsie, N. Y.

Gordon Swardenski
Peoria, Ill.

Ronald W. Updike
Speedway, Ind.

*The* **Tool Engineer**

# Editorial

## Members Make the Society!

In numbers there is strength. Judged by this axiom, the American Society of Tool Engineers is rapidly becoming the strongest professional organization in the country. Its rate of growth has been phenomenal both in number of members and chapters. This familiar quotation, insofar as its basic truth is concerned, is only part of the strength of an organization. It takes second place only to the quality and professional ability of the members themselves.

Recognizing this, the Society places high priority on all phases of its educational program. Cognizant of its responsibility, it is continually planning and providing meetings at which papers with high technical standards are presented. The pages of THE TOOL ENGINEER also contribute to keeping members posted and abreast of developments in their profession.

Increasingly, colleges and in-plant training programs are developing special courses for training tool engineers and production executives. The Society is actively supporting and encouraging these activities. The graduates of these courses will be the tool engineers of tomorrow and the leaders of industry. As these engineers build on the groundwork prepared by the tool engineers of today, so will the stature of the profession be enhanced and recognized by industry.

The obligation of each member is twofold both to himself and to his Society. First, by his own professional standards, he will attract new members accordingly. Second, he should keep abreast of the latest developments and improved methods in his chosen field. Two of the best ways to do this are through Society meetings and the pages of THE TOOL ENGINEER. Further, as better methods of production are developed, he should report them to his profession either in the form of papers or articles in his magazine. In this way, new life blood is attracted to the Society, assuring its continued growth on ever higher professional levels.

L. B. Bellamy

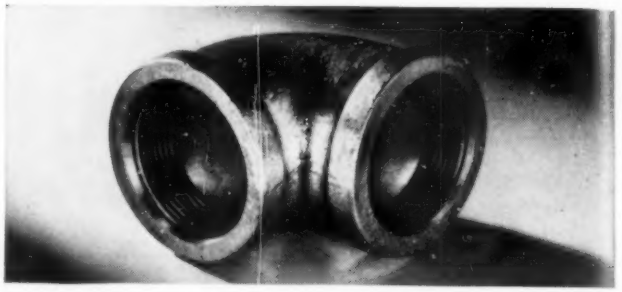
PRESIDENT
1952-1953

# S.E.C.O. SPEEDS MACHINING OPERATIONS, REDUCES REJECTS, INCREASES TOOL LIFE

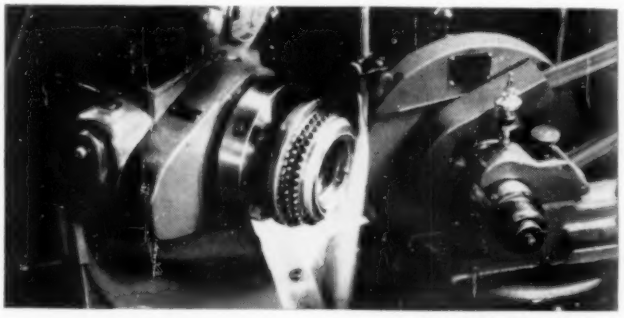
For any machining operation where an oil of its type can be used, Sunoco Emulsifying Cutting Oil will boost production, reduce downtime for cleaning and tool dressing.

A self-emulsifying petroleum product, S.E.C.O. forms a stable white emulsion when mixed with water. Its cooling and lubricating qualities make it particularly effective in the high-speed precision machining of ferrous and nonferrous metals. S.E.C.O. keeps machines clean, has a pleasant odor, and prevents rusting of parts between operations.

For complete information about S.E.C.O., write SUN OIL COMPANY, Philadelphia 3, Pa. Address Department TE-1.

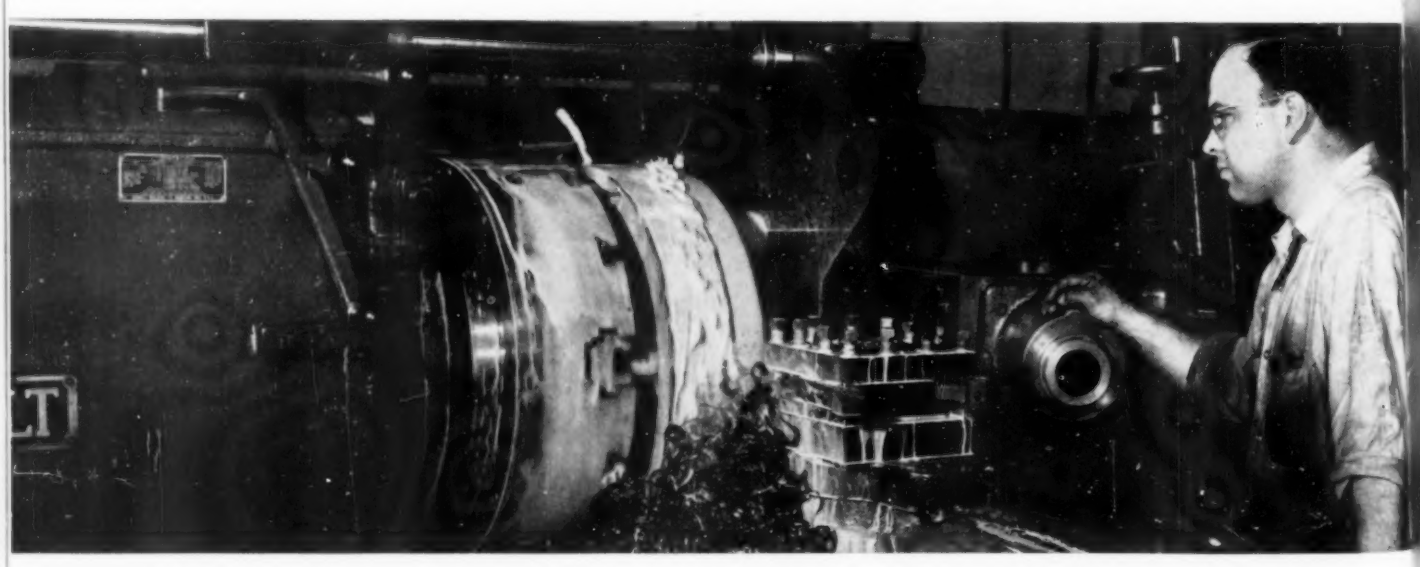


**MACHINE:** 2" automatic tapping machine • Parts: pipe fittings Metal: malleable iron • Operation: threading and chamfering 1½" 45° elbow • Cutting Speed: 75 sfm • Tools: high speed • Production: 306 pieces per hour • Cycle Time: 11¾ seconds • Cutting Oil: 1 part S.E.C.O. to 10 parts water



COURTESY BROWN& SHARPE MFG. CO.

**MACHINE:** Brown & Sharpe No. 2 Universal Grinding Machine Part: screw machine spindle sprocket • Metal: AISI-C1107 • Operation: grinding 90° included angle • Method: plunge-cut ground periphery of wheel • Grinding Oil: 1 part S.E.C.O. to 40 parts water



**MACHINE:** Gisholt turret lathe, model 4L • Part: 20" press mold shell, 22⅝" O.D., 6" depth, 20½" I.D. • Operation: turning and boring rough forgings • Materials: 40 to 50 carbon steel • Tools: Firthite carbide • Feed: .012 at 31 rpm • Cut: ½" to ¾" on O.D. and boring • Cutting Oil: 1 part S.E.C.O. to 10 parts water

**SUN INDUSTRIAL PRODUCTS**

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

SUNOCO®

Harry E. Conrad
*Executive Secretary*
Allan Ray Putnam
*Assistant Executive Secretary*

**Editorial**

John W. Greve
*Editor*
Robert T. Kimmel
*Associate Editor*
Nancy L. Morgan
*A.S.T.E. News Editor*
Dorothy J. Taylor
*Assistant Editor*

Robert Steiger
*Art Editor*

**Business**

Allan Ray Putnam
*Business Manager*
Clarence T. Etter
*Advertising Manager*
10700 Puritan Ave.
Detroit 21,
Michigan

Austin G. Cragg
*Eastern Advertising Manager*
400 Madison Avenue
New York 17,
New York

Richard E. Cleary
*Ohio Advertising Manager*
Commercial Bank
Building
Berea, Ohio

Stanley F. Girard
*Western Advertising Manager*
540 North Michigan
Avenue
Chicago 11, Illinois

W. R. McIntyre
*Pacific Coast Advertising Representative*
423 First Trust
Building
Pasadena 1, California

Michael Jakesy
*Production Manager*
Fay H. LaRoue
*Circulation Manager*

THE TOOL ENGINEER
Publication of The American Society of Tool Engineers
10700 Puritan Ave.
Detroit 21, Mich.

*The* **Tool Engineer**

# Standards Promote Progress

Frequently, the comment is heard that standardization stifles progress. The supporting reasons for such and similar claims is that, when designs and dimensions are frozen, there is no room for improvements nor for an engineer to use his ingenuity. He must conform to rules laid down by others.

Quite the contrary exists, however, when standards are properly developed. Many have proved the fallacy of the familiar arguments. Antifriction bearing and electric motor standards are but two that have definite advantages to producer, machinery manufacturer and user alike. In fact, any set of standards must benefit everyone concerned in order to survive the test of time. And the many angles of this acid test must be considered by those who lay the groundwork for a standardization program.

Insofar as ingenuity is concerned, a generous measure is required of those who originally determine the framework for the standards. They must be farsighted in that progress should not be hampered, specifying only such things as dimensions, performance, etc. that are necessary for uniformity but within which improvements may be incorporated.

Likewise, an engineer is often required to exercise considerable ingenuity in utilizing standard components. Frequently, it would be easier to design a "special." When such is the case, he should consider all of the added costs of development and production as well as those of maintenance. Usually, a standard unit proves advantageous and will justify its use.

Further, the use of standard components, instead of being stifling, frees the engineer from many details and allows him to employ his creative ability to better advantage in improving the features of design. Even when specials are indicated, the development that has gone into standard work is utilized to make a superior product.

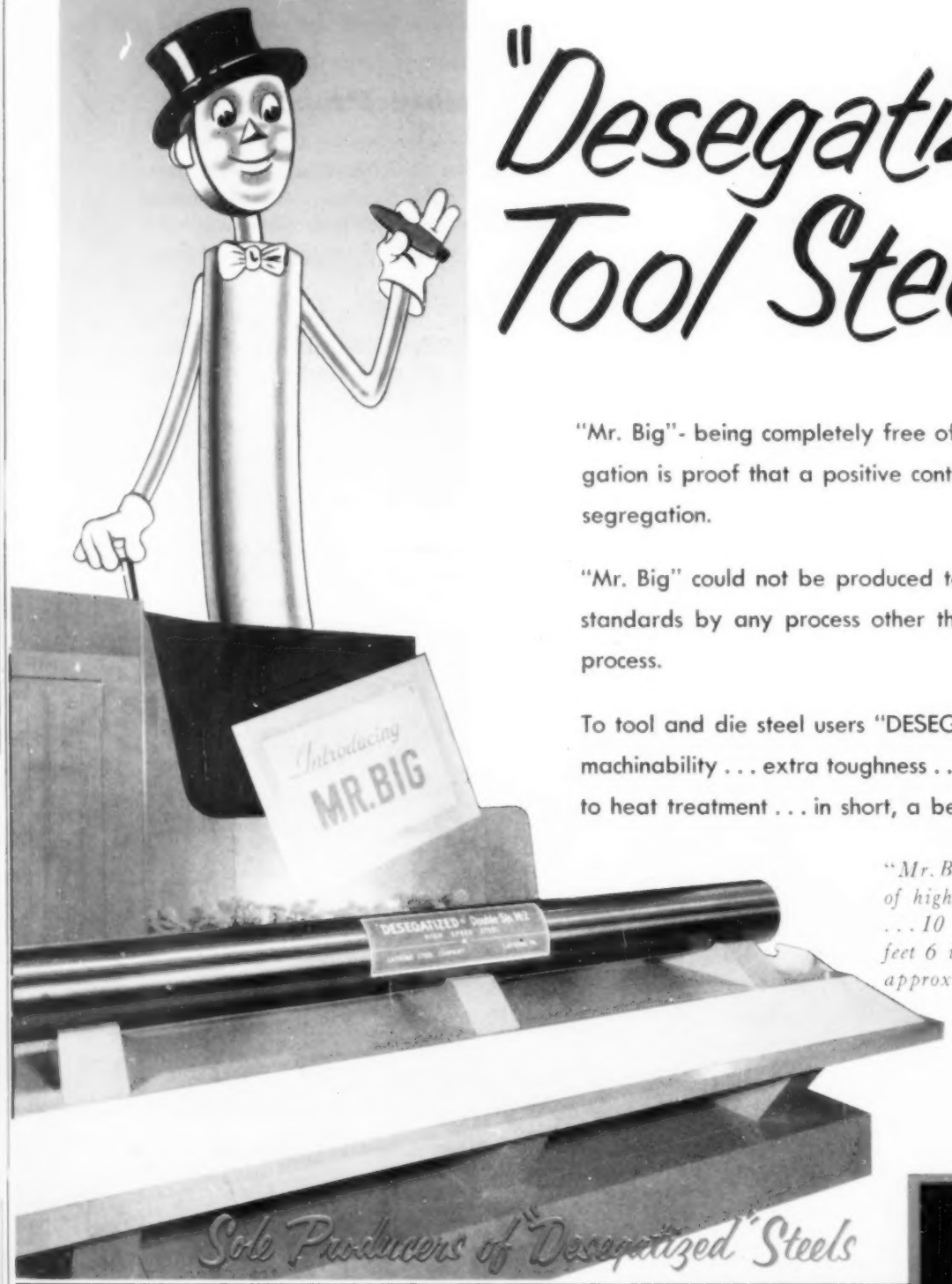
John W Greve

EDITOR

# MR.BIG

## . . . is proof of the superiority of

# "Desegatized"® Tool Steels




"Mr. Big"- being completely free of harmful carbide segregation is proof that a positive control exists for eliminating segregation.

"Mr. Big" could not be produced to the same high quality standards by any process other than the "DESEGATIZED" process.

To tool and die steel users "DESEGATIZED" means greater machinability . . . extra toughness . . . more uniform response to heat treatment . . . in short, a better tool or die.

*"Mr. Big" is the largest perfect bar of high speed steel ever produced . . . 10 inches in diameter . . . 9 feet 6 inches long . . . and weighs approximately 2600 pounds.*

*Sole Producers of "Desegatized" Steels*

**Latrobe STEEL COMPANY**

General Office and Plant: Latrobe, Pa.

BRANCH OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

# Cutting Forces and Temperatures When Milling with Carbide Cutters

By H. Opitz and J. Kob
Professor in Charge Research Engineer
Machine Tool Laboratory
Technical University
Aachen, Germany

**Dealing with phases of milling which have not been widely discussed in this country, this article should prove both interesting and useful to tool engineers. The terminology and accuracy of the discussion have been checked by Dr. A. O. Schmidt, research engineer at the Kearney and Trecker Corp., who says that it will "help to evaluate better some of the statements about cutting forces and temperatures which have been made earlier in various publications in this country and abroad."**

USE OF CARBIDES for continuous cutting operations such as turning, has been accomplished without encountering great tooling obstacles. Application of carbides to interrupted cutting such as milling, however, has required extensive testing. Difficulties resulted from the brittleness of carbides and concomitant sensitivity to shock and vibration.

To minimize these limitations, it was important first of all that the initial shock at each tooth engagement occur in a zone away from the sensitive cutting edge and, second, that the shape of the cutting edge be made as strong as practical. The consequence was that tools which had true negative rake angles were applied and only then was it possible to mill some materials, especially steels, with carbides.

Tests conducted during the last two years in the laboratory for machine tools and production technique at the Technical University at Aachen were concerned primarily with the angles of the tool. The design of the cutting edge with respect to the instant of entrance into the workpiece is especially important because, in most cases, the type of entrance is a determining factor in tool life.

It was found that a relatively long period of entering, the time between the initial and complete contact of workpiece and tooth face, reduces the wear at the cutting edge. Relatively long periods of entering time can be obtained through proper

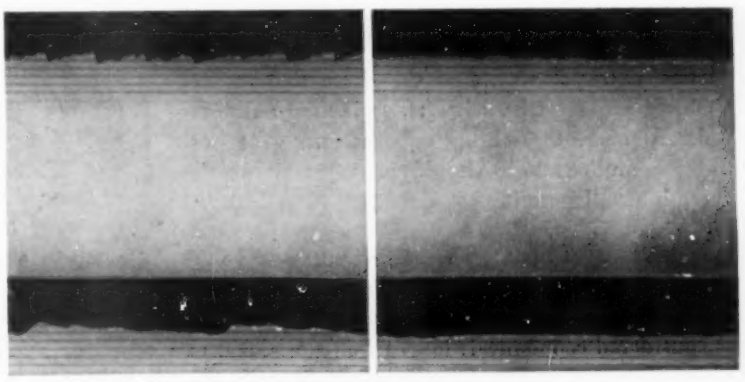


**Fig. 1. Roughness diagrams of milled surface as produced with a Forster surface measuring instrument. Left, depth of roughness 120 to 160 microinches (measured in a direction radial to the axis of the face mill). Right, depth of roughness 40 microinches (measured in direction of feed). Workpiece material is steel, having 128,000 psi tensile strength; cutting speed 820 fpm; feed per tooth, 0.0024 inch.**

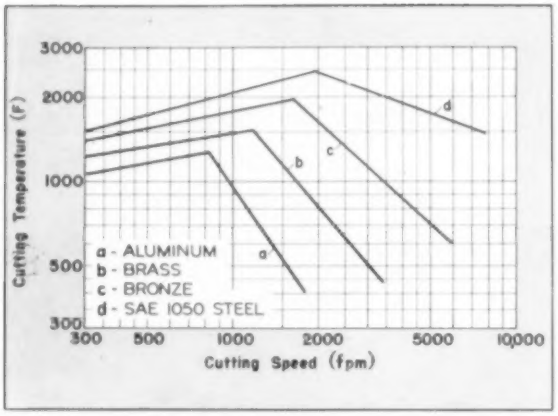



**Fig. 2. Cutting temperatures in relation to cutting speed for various materials.**

choice of negative rake angles and favorable positions of the cutter axis with respect to the workpiece surfaces.

After the impact and time of entering effects on tool life and tool wear had been determined, further tests were conducted to determine the optimum tool angles for milling steel and cast iron. Independent of the strength properties of the steels tested, low values of wear for very definite rake angles were established. These optimum rake angles lie within the limits of -7 to -13 degrees for steels of tensile strength properties between 50,000 and 140,000 psi. It was established that, with increasing strength properties and cutting speed, tools with larger negative angles generally showed less wear.

Further tests were concerned with optimum rake angles for different types of cast iron. For medium to hard types these are between 0 and -5 degrees. With hard cast irons of 95 Shore scleroscope, satisfactory results could be obtained only by making the rake angle -15 degrees. For softer types of gray cast iron which require only small cutting forces, rake angles with small, positive values can be chosen.

Negative rake angles require more power, the amount being about one percent for each degree. Grinding a negative ridge at the cutting edge of a positive-rake tool will reduce this power increase. Measurements for the application of a negative ridge in comparison to a true negative rake angle resulted in a decrease of as much as 22 percent in the power requirements of the drive motor. Regrinding a tool with such a ridge is more economical. To make the cutting edge as strong as possible the relief angle should be as small as the operation will permit.

**Speed and Feeds:** The cutting speed and feed per tooth also have an influence on wear. For milling with carbides, the following cutting speeds can be considered economical: low carbon steels, 500 to 720 fpm; medium carbon steels, 400 to 500 fpm; higher carbon steels, 300 to 400 fpm.

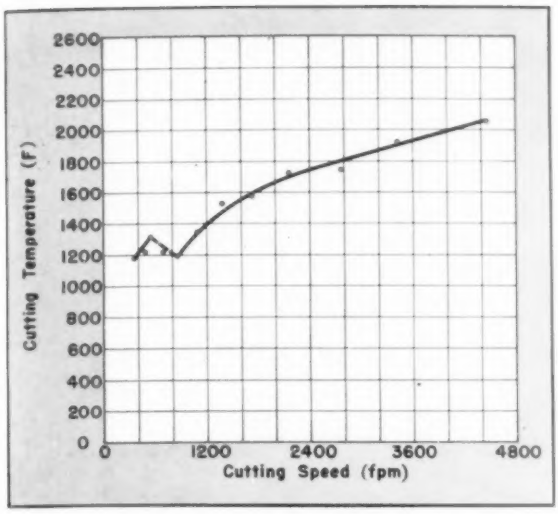
These high cutting speeds require a modern, rigid milling machine with high power. Selection of the proper feed is especially important when milling with carbides. Feeds of 0.008 to 0.012 ipt for steel and up to 0.016 ipt for cast iron have proved economical. Feeds below 0.004 ipt should be permitted only when a high surface finish is required. At feeds below 0.002 ipt, tool wear increases very rapidly. Temperature measurements taken during operations at these small feeds in which the tool practically is scraping rather than cutting were very high. Depth of cut has an effect similar to feed per tooth; depths of cut which are too small cause great wear and are therefore uneconomical.

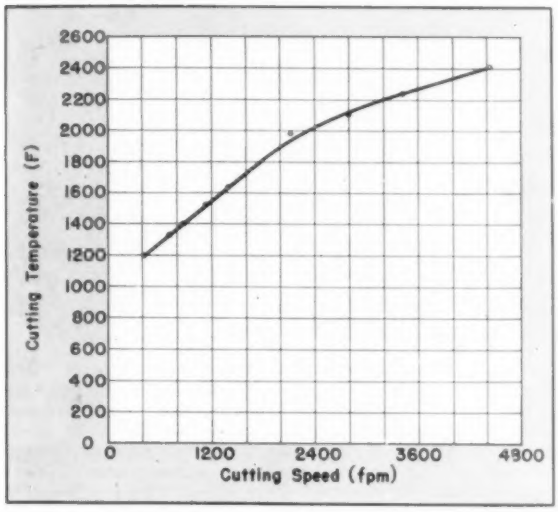
Through the choice of suitable cutting speeds and feeds, surface finishes can be obtained in milling which are similar to those obtained in grinding. Typical profile diagrams of a milled surface are shown in *Fig.* 1. Steel with a tensile strength of 128,000 psi was milled at a cutting speed of 820 fpm and a feed of 0.0024 ipt. The two diagrams on the left show the profiles of the milled surface in directions radial to the cutter axis. The two diagrams on the right show profiles in the direction of feed after the milling cutter had heeled over the surface. The evaluation of the first two diagrams gives peak to valley roughness measurements of 120 to 160 microinches similar to those for grinding. In the diagrams on the right the values are even below 40 microinches. The waviness of the surface, which depends upon the condition of the machine and the accuracy of the milling cutter, is only about 80 microinches.

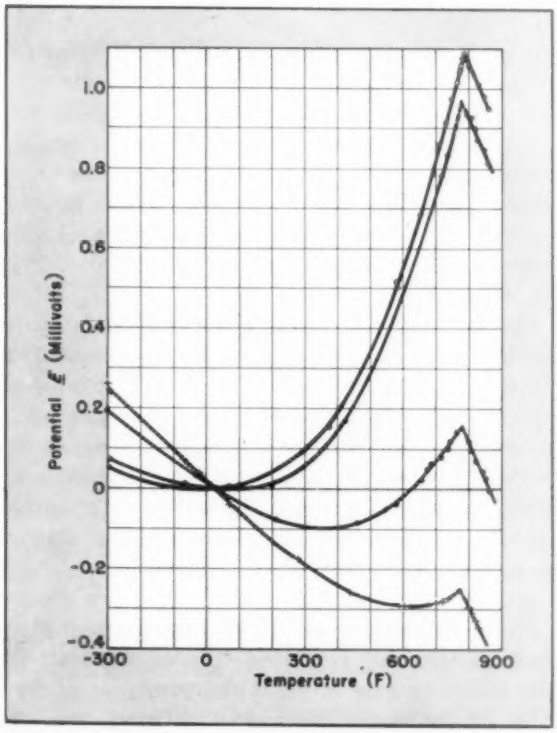
**Design Factors:** After the most important factors which influence the entrance of the cutter had been defined, the milling operation proper was more closely investigated. Here it was of interest, as in any other metal-cutting operation, to determine primarily the cutting forces and cutting temperatures since these are of paramount concern in the design and economy of the machine and tool. Beyond that, the variations in the values of the cutting forces and cutting temperatures during a milling operation must be considered.

Recent articles have stated that if rotating tools are operated beyond a certain high cutting speed, the cutting temperatures will decrease. It also has been stated that, with a further increase in cutting speed, cutting temperatures would be as low as those at ordinary cutting speeds. [1]* This was a reference to the patent of Salomon which was issued to the Krupp Company in 1925 (German Patent No. 523594). Temperature curves for various materials from one such publication are shown

*Figures in parenthesis refer to references at the end of the article.




in *Fig.* 2. Cutting temperatures for aluminum, brass, bronze and steel versus cutting speed are plotted on a log-log scale. With all these workpiece materials there was a sudden drop in temperatures at a characteristic point. Unfortunately, no definite statements with regard to tool life were made in these publications. [2, 3]

**Test Procedures:** To check on the two conditions, measuring instruments were developed which permitted temperatures and cutting forces to be determined simultaneously. Steel cutting grades of the tungsten-titanium-tantalum types of carbides were used in all these tests. The equipment and machines used in this work have been described earlier. [4] The tests were carried out on a Heller milling machine of the FH 120 type with a drive motor capacity of 36 hp and a maximum spindle speed of 1500 rpm. With a face mill cutter which had a diameter of 11½ inches, it was possible to obtain a cutting speed of 4500 fpm. *Figs.* 3 and 4 show the cutting temperatures.

Steels of the SAE 1010 and SAE 1035 types were milled. The results do not indicate a temperature decrease for any of these cutting speeds. While the maximum cutting temperature was about 2000 deg F when milling steel of the SAE 1010 type, it increased to 2400 deg F when milling steel of the SAE 1035 type. The tool life was therefore very short with these high cutting speeds and temperatures. The sudden increase in the temperature for the SAE 1010 type of steel at about 600 fpm takes place with the transition from a short segmented chip to a long continuous chip.

When milling steel of the SAE 1035 type at high cutting speeds, temperatures which came close to the melting point of the milled material were obtained, *Fig.* 4. There must therefore be a liquid phase between the chip and tool surface at these high cutting speeds. A close inspection of *Fig.* 2 shows that the bend of the temperature curves is close to the melting point.

Since these temperatures were determined by measurements of thermal voltages, it was necessary to check the relationship of thermal voltages to actual temperatures in the vicinity of the melting point. The calibration curves for thermal elements as indicated in the literature [5] show a tendency as illustrated in *Fig.* 5 when the melting point has

**Fig. 3 (top). Cutting temperature in relation to cutting speed when milling SAE 1010 steel. Rake angle, −16 degrees; depth of cut, 0.120 inch; feed per tooth, 0.004 inch.**

**Fig. 4 (center). Cutting temperature relative to cutting speed when milling SAE 1035 steel. Rake angle, −16 degrees; depth of cut 0.120 inch; feed per tooth, 0.004 inch.**

**Fig. 5 (bottom). Thermovoltage of zinc against copper alloy in relation to temperature (after A. Schulze).**

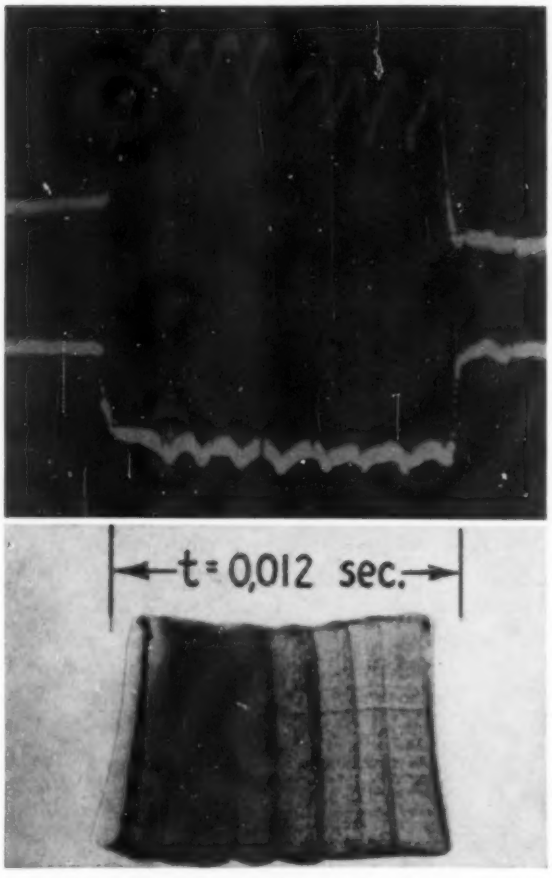



**Fig. 6. Changes in cutting force and cutting temperature when forming a segmented chip. Workpiece material, SAE 1010 steel; carbide tool cutting speed, 380 fpm; depth of cut, 0.120 inch; feed per tooth, 0.004 inch. In the oscillogram the tangential cutting force (upper trace) is 135 to 175 lb and the cutting temperature (lower trace) is 1166 to 1418 F.**

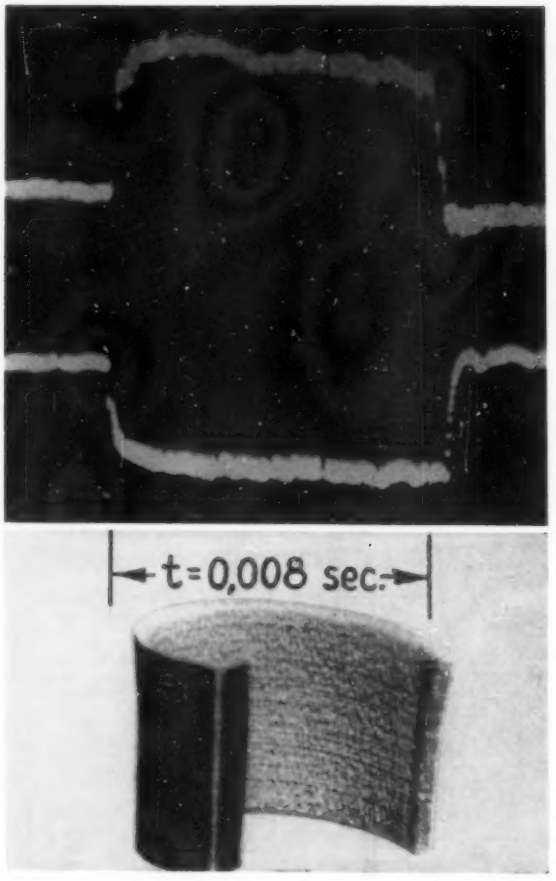



**Fig. 7. Cutting force and cutting temperature when forming a continuous chip. Workpiece material, SAE 1010 steel; carbide tool cutting speed, 580 fpm; depth of cut, 0.120 inch; feed per tooth 0.004 inch. In the oscillogram the tangential cutting force (upper trace) is 145 lb and cutting temperature (lower trace), 1418 F.**

been reached. It can be seen that the thermal voltage decreases above the melting temperature. It can therefore be stated that measurements close to the melting point will show thermal voltages but not true cutting temperatures.

As long as the melting points of workpiece materials are below the point at which carbides lose their cutting hardness, e.g., aluminum, it is possible to increase the cutting speeds at will. Because of the fluid friction between the chip and the surface of the tool, no appreciable temperature increase will occur.

Further tests were concerned with the measurement of cutting forces and cutting temperatures at lower and medium cutting speeds. At first, these values were determined for segmented chips. *Fig.* 6 shows the cutting force and temperature when milling SAE 1010 type steel at 380 fpm cutting speed. Below the cathode-ray oscillogram the chip which was formed during this interval is shown. The cutting force varied between 135 and 175 lb during the formation of each segment, while the cutting temperature varied between 1166 and 1418 F.

Exact evaluation of the enlarged oscillogram disclosed that the cutting force is at a minimum when the temperature reaches a maximum. This observation can be explained as follows: After the cutter tooth enters the workpiece, the material is compressed. This compression requires an increase in the cutting force up to a point at which a shearing stress large enough to fracture the workpiece material is reached.

In the instant of shearing, the cutting force decreases suddenly but the segment of the chip begins to slip on the rake surface of the tool. Because of this, an additional amount of heat due to friction is generated which causes again an increase in the cutting temperature. This oscillation between maximum and minimum cutting force and cutting temperature repeats itself frequently while a chip is being formed.

**Chip Formation:** Conditions are different when a continuous chip is formed. This is illustrated by the following case in which the cutting speed had been increased to 580 fpm: The oscillogram in

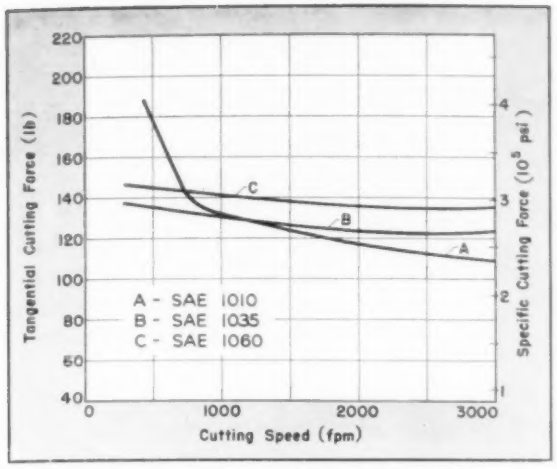



**Fig. 8. Tangential cutting force and specific cutting force in relation to cutting speed when milling steel. Depth of cut, 0.120 inch; feed per tooth, 0.004 inch.**

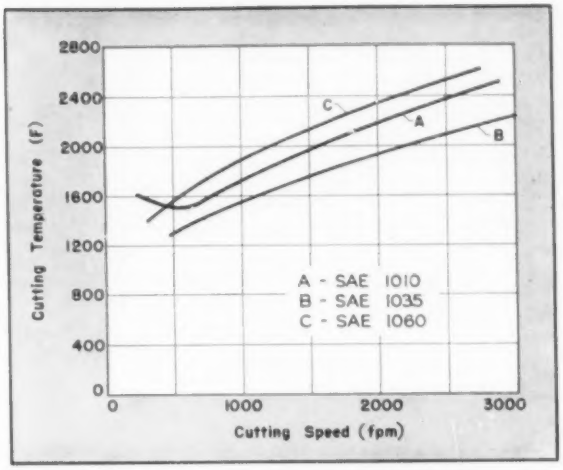



**Fig. 9. Cutting temperatures relative to the cutting speed when milling steel. Conditions are the same as in *Fig.* 8.**

*Fig.* 7 shows that with a continuous chip, neither the cutting force nor the cutting temperature changes appreciably. The chip as formed under these conditions is shown below the oscillogram.

Wear at the cutting edge is quite different with the various chip formations. This was especially noticeable when milling SAE 1010 type steel, which had a great tendency to stick or weld to the tool tip, causing a crater of 0.020-inch depth on the tool surface. When a continuous chip was formed no crater was observed on the tool after the same amount of material had been cut.

In a further series of tests the relations of the cutting force and cutting temperature to cutting speed, depth of cut and feed were investigated. *Figs.* 8 and 9 show the changes of cutting force and cutting temperature in relation to cutting speed for various kinds of steel. Again it can be seen that changes occur during the interval of chip formation from a segmented to a continuous chip when milling steel of the SAE 1010 type. Within the speed range in which segmented chips are formed, the main cutting force and the specific cutting force decrease considerably.

This tendency of decreasing cutting force, although less pronounced, also can be observed in the speed range in which a continuous chip of SAE 1010 type steel is formed. There was much less variation of the cutting force when milling steel of the SAE 1035 and SAE 1060 types. The cutting temperature increases continuously with the cutting speed except for a certain amount of variation during the changes in chip formation for the SAE 1010 type steel. The steel actually used in these tests was a low-carbon steel similar to structural steel and showed a strong tendency to form a built-up edge.

The influence of feed upon cutting force and cutting temperature can be seen in *Figs.* 10 and 11. When milling steel with carbides the feed was varied within the limits of 0.002 to 0.012 ipt. The cutting

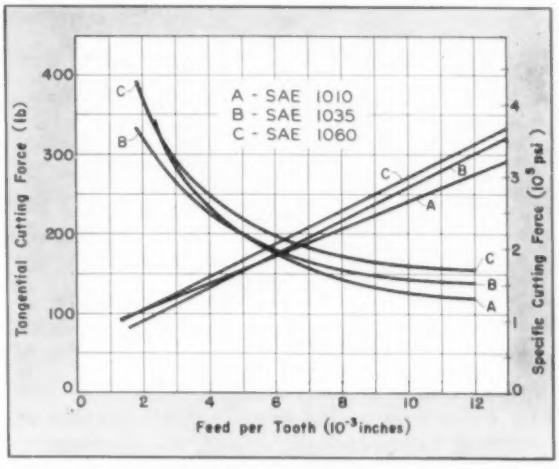



**Fig. 10. Tangential cutting force and specific cutting force in relation to feed per tooth. Cutting speed, 740 fpm; depth of cut, 0.020 inch.**

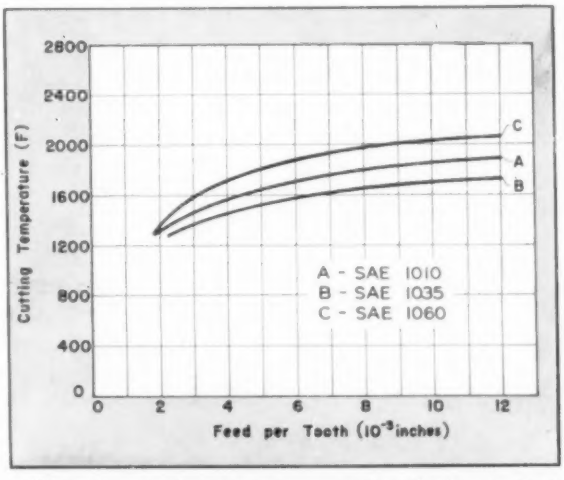



**Fig. 11. Cutting temperatures in relation to feed per tooth. Cutting speed, 740 fpm; depth of cut, 0.120 inch.**

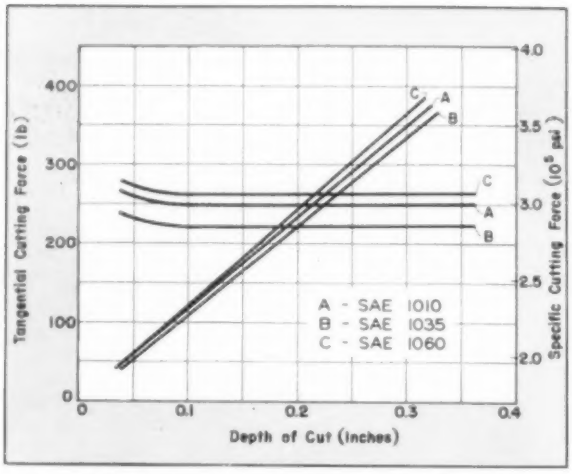



**Fig. 12. Tangential cutting force and specific cutting force in relation to depth of cut. Tangential force is represented by sloping lines and specific cutting force by horizontal lines. Cutting speed, 740 fpm; feed per tooth, 0.004 inch.**

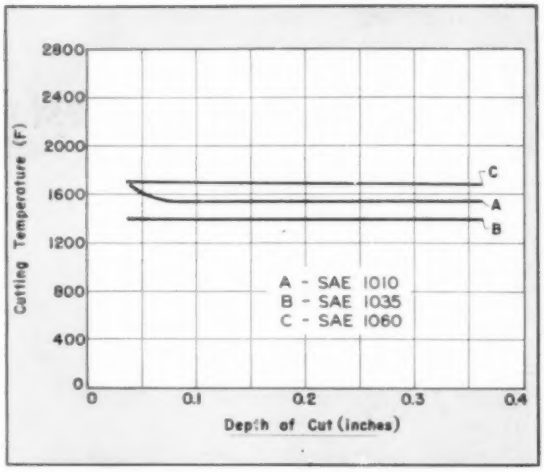



**Fig. 13. Cutting temperatures relative to depth of cut. Cutting speed, 740 fpm; feed per tooth, 0.004 inch.**

force increased with increasing feed while the specific cutting force decreased. It is essential to note that the cutting temperature increased less rapidly with an increase in the feed than with an increase in cutting speed.

**Economy of Operation:** The efficiency and economy of a milling operation can be increased in three ways through: (1) greater depth of cut, (2) higher cutting speed, and (3) increased feed. Of these three, the depth of cut is usually predetermined so that the operation can be improved only by increasing the cutting speed or the feed. In both cases a decrease in the specific cutting force can be gained. However, the cutting temperature increases more rapidly with increasing cutting speed than with increasing feed.

Since cutting temperature is a determining factor in tool life, it is more practical to increase the efficiency by increasing the feed rather than by increasing the cutting speed. *Figs.* 9 and 11 may be used as explanatory examples. If the volume of chips per unit of time is doubled by increasing the cutting speed for steel from 740 to 1480 fpm, the cutting temperature of the SAE 1035 type will increase about 21 percent from 1450 to 1760 deg F. In doubling the efficiency by doubling the feed from 0.004 to 0.008 ipt, when machining the same type of steel at a cutting speed of 740 fpm, the cutting temperature will increase only 14 percent from 1450 to 1650 deg F. However, the amount of feed is also dependent upon the surface finish required as well as upon the horsepower and rigidity of the milling machine.[6]

The third influence, depth of cut, was also investigated. The results can be seen in *Figs.* 12 and 13. For a cutting speed of 740 fpm (continuous chip) the depth of cut was varied between 0.040 and 0.360 inch. With an increase in depth of cut the cutting force increases linearly while the specific cutting force remains practically constant except for very small depths of cut at which the effect of the blade face is more noticeable. The cutting temperature remains constant also within the limits of the investigation.

It can be seen in *Figs.* 8 and 9 that the cutting force and cutting temperature for SAE 1010 type

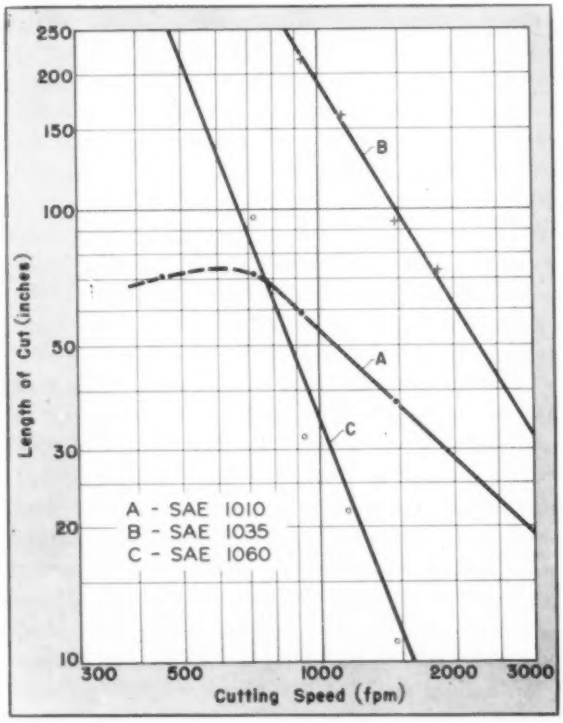
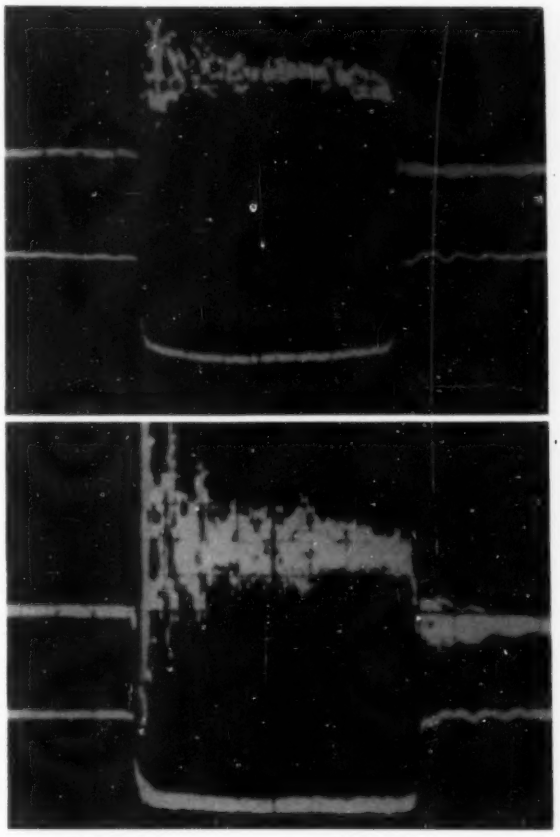



**Fig. 14. Length of workpiece milled with a single-tooth cutter in relation to cutting speed. Feed per tooth, 0.004 inch; rake angle, −13 degrees. Cutters were removed for resharpening when depth of crater reached 0.008 inch as determined with a Schmaltz surface measuring instrument.**

**Fig. 15. Maximum variation of cutting force in relation to overhang of milling cutter tooth. Carbide tips brazed to a steel shank inserted in face mill body. Upper oscillogram for a one-inch overhang: cutting force (upper trace), between 45 and 220 lb in compression only. Lower oscillogram for 1¾-inch overhang: cutting force (upper trace), varied between 385 lb in compression and 165 lb in tension.**



steel are much higher when forming segmented chips than when forming a continuous chip at a slightly faster cutting speed. The same phenomenon prevailed at various depths of cut. The results show that the depth of cut must be chosen in relation to the horsepower and rigidity of the machine and as deep as tool and workpiece will permit.

Very high cutting speeds cause a comparatively short tool life due to the higher temperatures at the cutting edge. In *Fig.* 14 are plotted the lengths of workpiece machined in relation to cutting speed when milling workpieces 1 9/16 inches wide at 0.120-inch depth of cut with a single-tooth cutter.

**Tool Vibrations:** As mentioned before, carbide tools are sensitive to vibrations. By changing the amount of overhang of the teeth the effect of changes in the natural frequency of the tool upon the cutting force was investigated, *Fig.* 15. The vibrations which occur due to the impact of the tool upon the workpiece cause a change in the cutting force in relation to the natural frequency. As the upper oscillogram of the cutting forces shows, the vibrations are dampened partially because of friction during the cut. Above a certain amount of overhang, more than one inch in the investigated case, the amplitudes of the vibrations became so great that in addition to fluctuating compressive stresses there were also alternating compressive and tensile stresses. In most cases this is related to breakage of the cutting edge or to the complete destruction of the carbide tip.

The tests also show a certain influence of the material to which the carbide tip has been fastened in relation to damping capacity and therefore the effect upon tool life. It is intended to investigate these questions in future tests.

## Bibliography


1. "New Methods of Working and Design of Milling Machines" Alfred Duerr, *Industrielle Organisation*, (Zurich) No. 11, 1950, pp. 567-576.
2. "Are We Slowpokes at Machining" E. J. Tangerman, *American Machinist*, Vol. 93, Dec. 29, 1949, pp. 55-57.
3. "Are Shop Men Scared of High-Speed Machining" E. J. Tangerman, *American Machinist*, Vol. 94, March 6, 1950, pp. 85-89.
4. "Instruments for Force and Temperature Measurement in Metal Cutting" H. Opitz and K. Kuesters, *Werkstatt und Betrieb*, Vol. 85, No. 2, Feb. 1952, pp. 43-47.
   *The Engineers' Digest*, Vol. XIII, No. 5, May 1952, pp. 145-148.
5. "Metallic Materials as Thermoelements" A. Schulze, *N.E.M. Publisher*, Berlin.
6. "Influence of Carbide Applications in Milling and Planing" H. Opitz and J. Kob, *Werkstatt und Betrieb*, Vol. 84, No. 5.


# Another Gage 'First'

The first automatic gage for checking dimensions of a loaded and assembled round of 90-millimeter ammunition has been designed and built by The Sheffield Corp. in cooperation with Picatinny Arsenal. The 10-ton machine is believed to be the largest gaging device ever produced.

The three-foot round of ammunition weighing 43 pounds is received by the gage after it has been filled with a high explosive bursting charge and propelling powder. The round is then presented by mechanical handling to the maximum profile and alignment chamber gage. The chamber gage is similar in shape to the chamber of the gun, but its dimensions are accurately controlled to a few ten-thousandths of an inch.

If the assembled round fits here, it is acceptable and provides assurance that components manufactured in hundreds of plants through the country will fit and function in the chambers of guns made by various manufacturers. Any eccentric, misaligned or oversize rounds will be rejected by the mechanized chamber gage.

The accepted rounds are mechanically moved out of the machine to the point where they are packed.

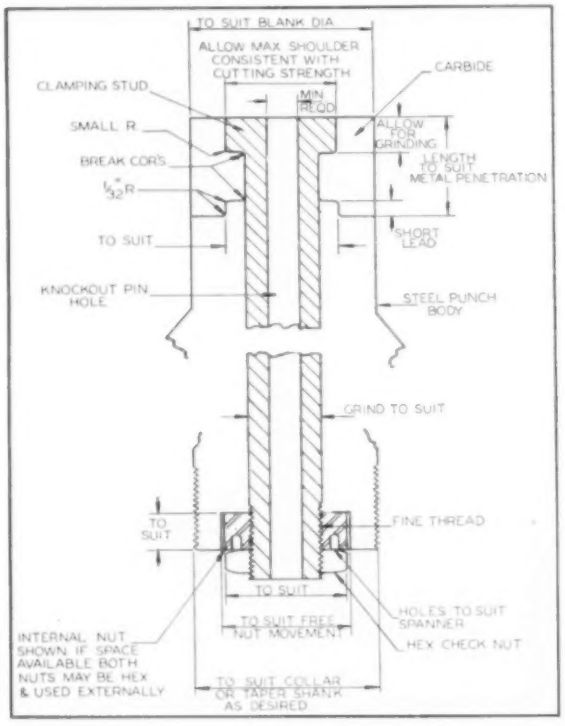
# Gadgets

**Ingenious Devices and Ideas to Help the Tool Engineer in His Daily Work**

## Carbide Punch Clamp

When using steel blanking punches to gang-blank up to 3/8-inch gage brass in the medium diameter range, considerable difficulty is encountered with frequent chipping and dulling.

Tungsten carbide-tipped punches furnish an answer to these problems, providing the tip is properly fastened. The usual brazing or screw methods of clamping are not effective, since brazing material has a tendency to crystallize under heavy repetitive shock, while screws or screw




inserts are necessarily too small to be practical with heavy-gage material. Knockout pins are also usually required to eliminate interfering blank tippage as the punch ascends, further complicating the fastening method.

The accompanying sketch illustrates a carbide-tipped punch with a positive clamping arrangement and provision for a knockout pin. The punch lead should be a push fit for the carbide tip, and the clamping stud and head should be a sliding fit. The stud head must be flush with the carbide to eliminate marked blanks. A fine thread on the nut end of the stud will result in a more shock-proof fastening. The spanner nut can be secured by a check nut as shown. The knock-out pin can be spring or press-activated as desired.

Dimensions are regulated by product size; however, it is recommended that the strip metal does not clear the carbide tip; therefore, it is advisable to consider metal penetration when estimating tip thickness.

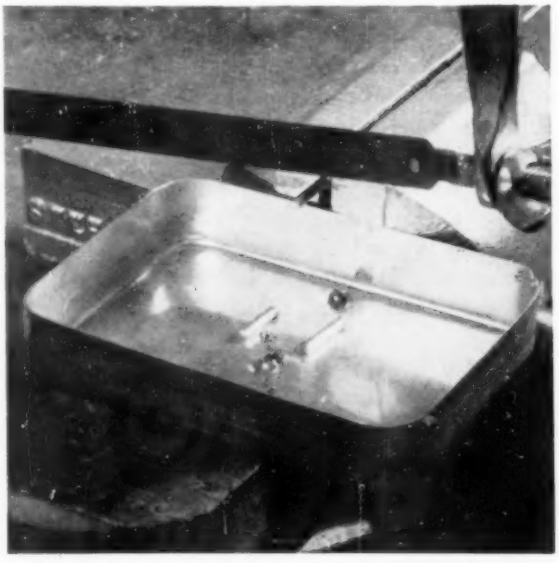
With this method of attachment, spare carbide tips can be kept in stock and readily inserted, thus avoiding production delays and a large punch inventory.

*Wm. V. Anderson*
*Torrington, Connecticut*

***Contributions for these pages describing short cuts for the tool engineer are welcome. Finished drawings are not necessary. Payment for accepted articles is made upon publication.***

## Vise Tray for Small Pieces

Pins, dowels and small screws that are sawn off in the vise frequently wind up on the shop floor where a search on hands and knees must be made for them. The attachment for the vise shown here will prevent this time-wasting maneuver. The tray can be made in about 15 minutes and in no way interferes with the vise.



The tray is mounted on the moving element of the vise by a clamp which is formed from a continuous strip and then soldered to the tray. With the tray in place, any parts which are sawn off will be caught and held.

*F. E. Riley*
*London, England*

## Producing Form Tools

This method for making form tools is applicable for any contour and the tool cuts the exact desired form. The step-by-step procedures follow.

Assuming that the form tool is to cut a ball, as suggested by sketch A in the illustration, start with a thin templet as shown at B. This templet should be made to the exact contour of the part to be turned, preferably from sheet stock not over 1/16 inch thick. Make a blank for a fly cutter, as shown at C and color the front face with blue vitriol.

Using the gage sides of both, scribe the contour to be produced on the face of the fly tool from the templet, as suggested by Sketch B. Then clamp the fly tool in a universal vise, set to the desired rake angle which, for the purpose of consistency, is here stated as 12 degrees. The tools should be positioned as shown by the heavy broken lines in sketch D. Rough out the contour to the scribed lines, working from the face of the tool, and clear away excess stock on the back as shown at extreme upper right, sketch D. Leave a land about 5/64 inch wide.

The next step is to make a gage for the fly tool. Take a sheet of Plexi-glas and to it attach a parallel as suggested by sketch B. Attach the templet to the Plexi-glas, gage side against the parallel. Then, butt the fly tool against the templet and file or grind the contour until it matches with the templet. Be careful to maintain an even rake angle all along the contour.

Then harden the tool, draw temper and grind the face and back. Take the lightest possible skimming cut on the gage side of the tool for truing. Again mating the contour with the templet, stone the profile until it matches the templet. When light is shut out between the two, the tool can be considered finished. It becomes the master tool.

Using either the templet or the master tool, scribe the contour on the back of the form tool blank, making allowance for the desired rake. Mount the blank in the universal vise as described for the fly tool and, working from the back, rough out the contour to the scribed lines. Leave the tool in the vise and mount the master against the back of the blank at the exact angle of inclination.

The final planing of the contour should be done on a milling machine with the master held in a fly arbor and the machine spindle locked, once the master is at the proper angle.

When the planed surface shows bright over its entire area, remove the blank and carefully stone or file the surface to remove fuzz or possible chatter marks. Harden the blank and draw temper, then restone the surface until bright all over. Grind the face and back. The tool is now ready for use.

*Andrew Rylander,*
*Walnut Creek, Calif.*

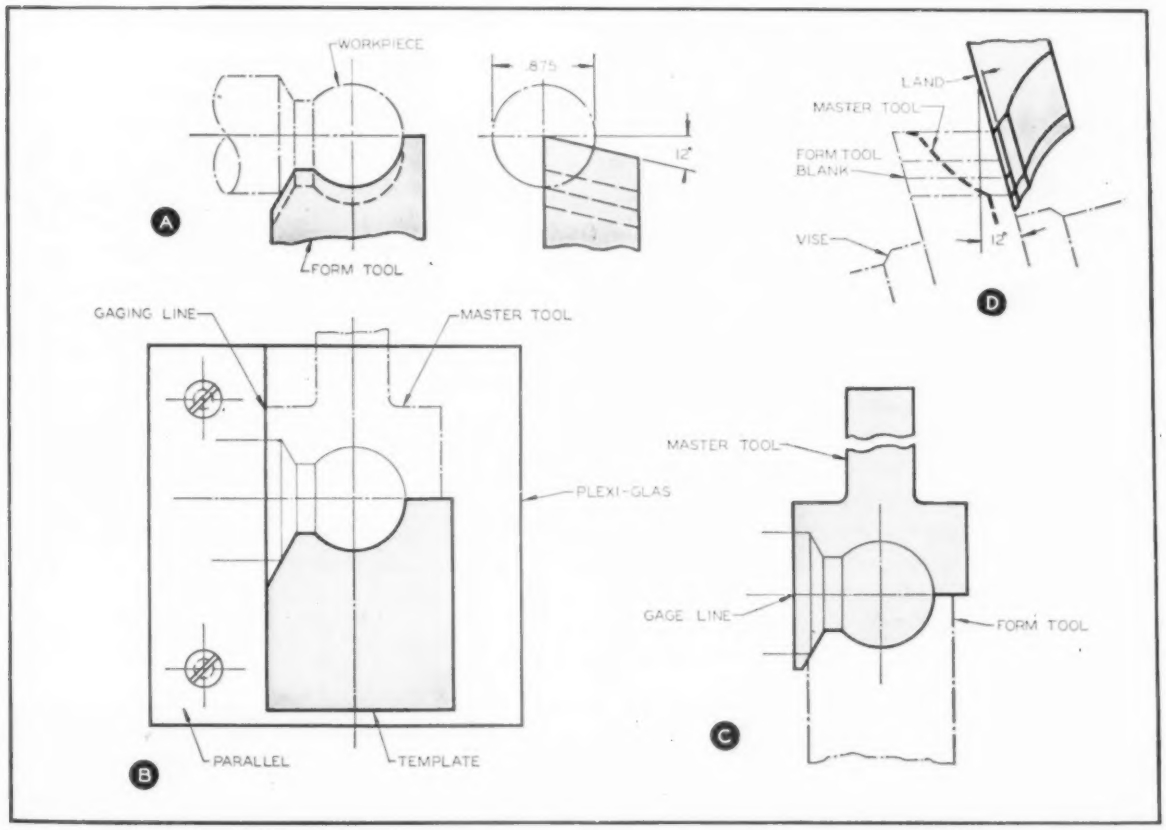



**Fig. 1. The work load and its distribution in the design and drafting department can be seen at a glance on this scheduling board.**

# Scheduling Designers' Work Load

**By A. E. Maiter***

**Leeds and Northrup Co.**
**Philadelphia, Pa.**

As NEW DESIGN projects are scheduled, tool engineers are called upon to work closely with development engineers to design special tools for pilot runs. At the same time, newer and better tools are being designed for present production.

At Leeds and Northrup Co. requests for new tools and the desired completion dates originate from other sources in the plant, such as time study and methods engineers and foremen, as well as from research and development sections. Formerly tool requests were sent to the tool engineering section where the design and drafting time was estimated and the project assigned to specific tool designers. With ten to thirty jobs in process at one time, the designers were instructed to complete the jobs in sequence according to their date.

This system of handling tool requisitions had numerous drawbacks. For instance, many important tool design jobs needed for completion by a certain date were bypassed unintentionally if another urgent requisition was received. It was also difficult to forecast tool design completion dates on various projects because there was no reliable work load indicating system. In order to determine available design time, it was necessary to check the amount of work assigned to each designer.

The rapidly expanding research and development programs called for a scheduling system with long range and flexibility. In order to direct the efforts of the tool designing staff intelligently and effectively, the scheduling system should show the availability of men for handling new projects.

To achieve these ends, the Remington Rand Sched-U-Graph, *Fig.* 1, method of scheduling has been adopted. It presents a picture of the work load of each designer, the status of the projects and, at the same time, provides a central source of control for all job assignments. A typical job card is shown in *Fig.* 2.

A color coding system according to project is also in use, with each scheduling card so coded. Thus, a glance at the board will show the number of jobs for any one tool project and the amount of time required to complete the assignments.

Another advantage of this system is that it creates an incentive for the staff to meet scheduled dates. Accurate forecasting of the availability of design time is now assured so that control of tooling dates is more efficient. An accessory to the Sched-U-Graph is a portable scheduling book unit designed at Leeds and Northrup. Entered in this book are the current research and development projects and the work load which they will entail for the design group. In this manner, future demands can be closely estimated to prevent overloading in the tool engineering section.

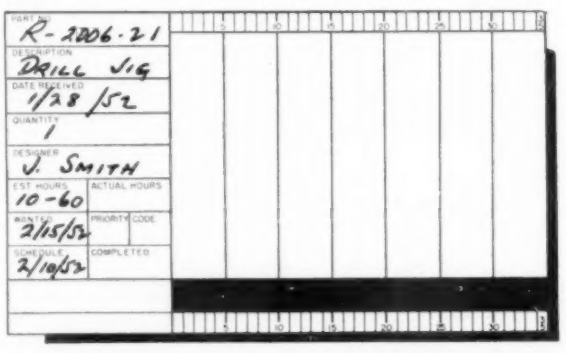



**Fig. 2. Scheduling cards are color-coded to show the number of jobs for any one tool project.**

*Senior member of ASTE Philadelphia Chapter 15.

# Shell Machining Techniques

By M. L. Backstrom

Assistant Chief Engineer
Carbide Division
Firth Sterling Inc.
Pittsburgh, Pa.

FORGING, DRAWING OR ROLLING slugs of steel into cylindrical shapes is but a fraction of the work which must be performed in the manufacture of shells for the many and varied types of artillery used by American Ordnance in modern warfare. Many intermediate machining and preparatory operations must be completed to result in a product capable of developing pinpoint accuracy and deadly detonation.

To increase the destructive effectiveness of the contained explosives, the shell must be fabricated from material having high strength, controlled to close tolerances. Providing the Ordnance Department with sufficient quantities of accurately dimensioned shells has been the task of production men and tool engineers.

A significant factor in the production of Ordnance products has been the use of sintered tungsten carbides as a tool material. The superiority of carbide tools led to the development of machines capable of withstanding the necessary forces to utilize to the greatest extent the unique characteristics of this material.

Improved forging practice has relieved to some extent the task imposed upon finishing tools and equipment. Shell, which in World War I was fabricated from solid billets by machining both the internal and external contours, is now forged, drawn, extruded, or upset to such dimensional accuracy that the internal and sometimes the external contours require little or no machining, *Fig.* 1.

Typical forgings that may be supplied to the finishing lines of a shell plant are shown in *Fig.* 2. At left is a shell formed by the hot extrusion process; the one in the center is pierced and drawn; the forging, right, is formed by upsetting.

When a shell is formed by hot forging, sufficient material must be provided to compensate in the finished product for variations which may result from the forging process. A weight ratio of 1½ to

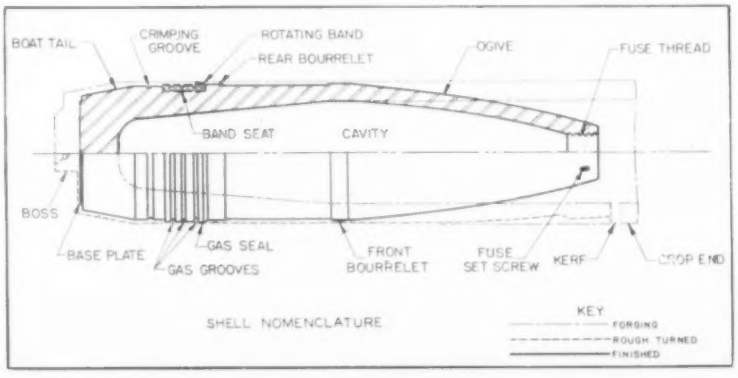



**Fig. 1. Illustrated here are the Ordnance terms which apply to the parts of a shell.**

2 times that of the finished product is not uncommon.

To insure the most accurate, rapid and economic removal of this stock, it is necessary that sintered tungsten carbides be applied with maximum efficiency.

All of the machining operations, whether performed with single-point or multipoint tools, may be classified as roughing or finishing operations.

The roughing group of operations provides a consistent and limited amount of stock for the final cuts. Most of the roughing operations are characterized by considerable variations in the amount of stock to be removed and are performed with relatively coarse feeds. The prime objective is to effect the most rapid removal of excess material.

Rigid work-holding fixtures, heavy-duty machines, copious supplies of coolant, and massive tool shanks are necessary to produce maximum quantity production with minimum down time.

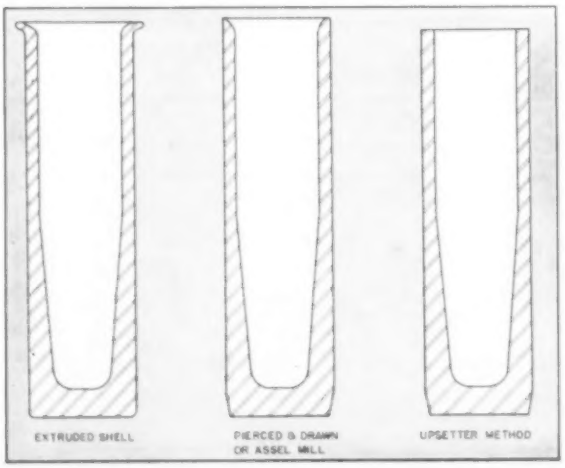
All of the operations prior to finish turning the OD of the shell may be included in the roughing group. Machining tolerances are considerably broader than those prescribed by Ordnance for the finished product.

A typical processing procedure and the general order in which the various steps are performed are shown in *Fig.* 3. Although this sequence may vary slightly for shells of different caliber, and the machine tools available, the same general operations must be performed.

Rough turning the OD is necessary to provide a concentric wall with a thickness gradient that will result in a cavity of satisfactory volume after nosing. Sufficient metal to assure thread length and wall thickness dimension as prescribed by the Ordnance Department must also be provided.

The operation is generally performed on single-spindle, multiple-tooled machines that permit the rapid removal of large quantities of material. The radial motion of the tool is governed by tracer equipment, and is fed horizontally by a gear, screw or hydraulic mechanism. A typical rough-turning setup utilizing multiple tooling and cam-controlled tracer equipment is shown in *Fig.* 4. Dividing the length of cut into four sections reduces the time to complete the operation by four. On large shells it is not uncommon to provide eight tools per setup and stock removal may be so great as to necessitate two roughing cuts.

**Fig. 2. Typical shell forgings which may be supplied to the finishing line.**




Depth of cut may vary from ⅛ to 1 inch and the feed range is normally on the order of 0.030 ipr. Surface speeds up to 300 fpm are generally used. The use of a 30 to 35-degree side cutting edge angle will increase tool life by strengthening the nose, providing initial contact back of the tool point, reducing chip thickness, and increasing the chip width for a given depth of cut.

Large shells require the use of brazed or mechanically clamped carbide tools or adequate section to resist the bending that might be caused by the tensile stresses induced by heavy cuts and feeds.

Neutral or negative rakes are recommended. If negative rakes are required, the minimum angle that will result in maximum tool life should be used. A two-degree negative rake angle increases the shear strength of the carbide in the direction of the tangential cutting force (the greatest of the cutting forces) by nearly 50 percent over that required for neutral rake and increases power requirements approximately 10 percent. Inasmuch as carbide has more than adequate compressive strength, a net gain of nearly 40 percent in shear strength occurs at the tip of the tools.

Smaller shells may be rough turned efficiently by utilizing Mechanigript inserts which provide six cutting edges per grind. Suitable toolholders are shown in *Fig.* 5. The applications to which mechanically held as well as brazed tools may be applied to advantage follow.

**Brazed Tools**

A. Applications
   1. Where tool shank dimensions must be held to one square inch or less.
   2. As cutoff tools, form tools and others where tool design requirements do not facilitate mechanical holding.
   3. For occasional or nonrepetitive work when large tool bodies are required.
   4. For machining of highly ductile materials requiring positive rakes and greater clearances.

B. Advantages
   1. Smaller shanks reduce steel and carbide requirements.
   2. Smaller inserts may be used than can be accommodated in mechanically held tools.

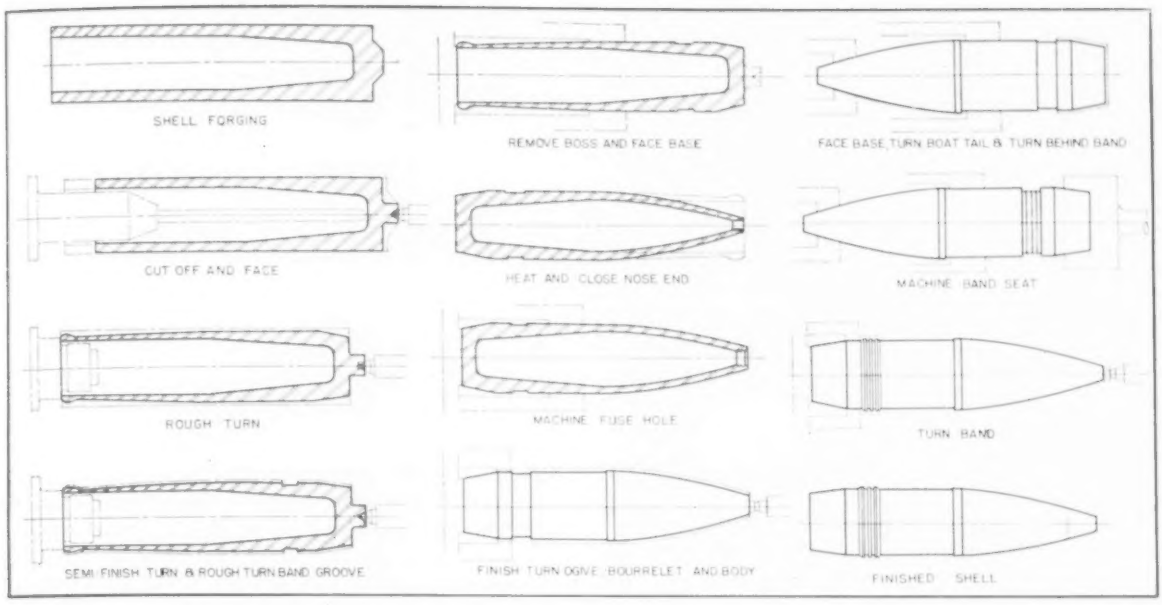



**Fig. 3. Processing procedure and the general order in which the steps are performed for producing a finished shell.**

3. Operations that cannot be performed with mechanically held tools may be done economically.

**Mechanigript Tools**

A. Applications
   1. High-speed, light machining ferrous alloys.
   2. Repetitive operations in high-production shops.

B. Advantages
   1. Requires minimum down time for tool changing and minimum of adjustment during operation.
   2. As high as eight cutting edges made available per grind. Reduce grinding time and tool material consumed per quantity of material removed.
   3. Eliminates strains due to grinding.
   4. Eliminates strains caused by difference in thermal expansion resulting from heat generated in cutting and brazing process.
   5. Eliminates maintenance equipment for brazing and servicing of shanks.
   6. Reduces inventories of tool and shank materials.
   7. Permits the use of harder and more wear resistant grades of carbide.
   8. Tool bodies are nonexpendable.

**Mechaniclampt Tools**

A. Applications
   1. Heavy duty, slower speed machining of all materials. General shop equipment.
   2. Machining of tough strain hardening materials such as armor plate, manganese steels and high temperature jet alloys.

B. Advantages
   1. Provides two-way adjustment for minimum carbide removal per quantity of material machined.
   2. Reduces thermal strains caused by high temperatures generated in slow-speed, heavy-feed machining.
   3. Reduces thermal strains caused by grinding. Provides added strength in tool body to withstand heavy cutting forces.
   4. Tool bodies are nonexpendable. Permits the use of harder and more wear resistant grades of carbide.
   5. Uses standard stocked rectangular blanks.

As previously mentioned, the cavity of the shell is formed to close tolerances in the forging process. This is accomplished by the use of a mandrel over which the shell is forged. The OD is controlled by the aperture of the final draw die, and the base thickness restricted by the opening between the punch and the bottom of the die pot in the piercing

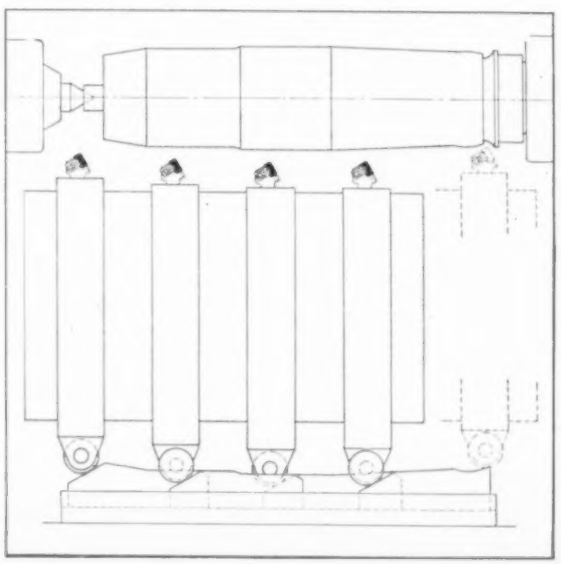


**Fig. 4. Multiple tooling setup and cam-controlled tracer equipment for rough turning a shell. The same setup is utilized for finish machining the shell, except that the cutting tools are different.**

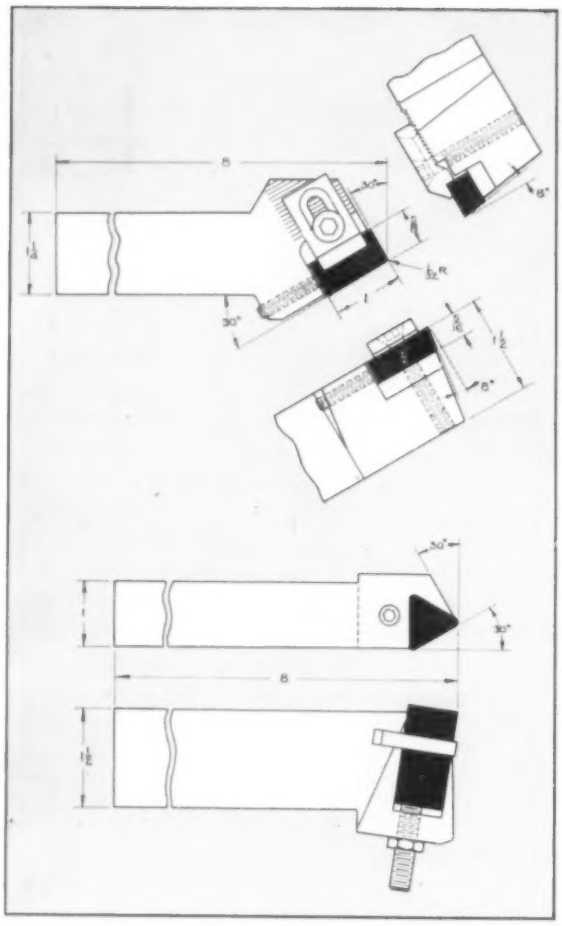


**Fig. 5. Mechanically held tools are efficient for rough turning small shells. At the top is a Mechaniclampt tool, bottom, a Mechanigript tool.**

operation or the use of a bumper block on the draw bench in the drawing operation. Variations in the volume of metal included in the billet or slug must necessarily be accommodated in the length of the cavity produced.

To provide a shell of uniform cavity length for the succeeding operations it is necessary that the crop end be removed and a constant dimension established. In the upsetter method of forging this excess metal may be removed by pinch or trim dies in the forge tool setup. On forgings formed by the pierced and drawn or Assel Mill process, the excess material must be removed by machining.

Cutoff tools as shown in *Fig.* 6 are required to remove the crop end. Unlike many cutoff operations on bar stock machining where the kerf must be held to a minimum so that nonproductive material may be minimized, the kerf is not limited by the width of material consumed in the operation. Kerf width may be varied to give maximum strength embodiment to the tool.

Failure of cutoff tools when machining tubular products generally occurs at the end of the cut as the excess metal is severed. Failure of this type may be avoided by the inclusion of a plan edge angle as shown in *Fig.* 6, and the restriction of the forward travel of the tool so that the material is not completely severed by the cutting operation but retained by a thin annular ring of 0.002 to 0.005 inch which is severed by mechanical means.

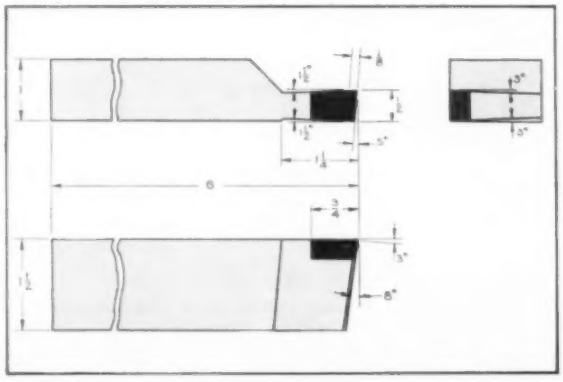
If sharp cutting tools are maintained, the crop end may be completely removed by a light hammer blow, or by an automatic shear, which may be included in the conveyor.

Rough facing the base end is required to form a suitable locating face for subsequent operations. The base is not entirely machined at this point. A boss in which the center is located must remain for locating and holding the shell for operations performed after nosing. It is necessary that sufficient stock be allowed in the forging process to permit drilling a suitable center which does not extend into the finished base. In addition, sufficient base thickness must be incorporated in the forging to eliminate seams or inclusions in the finished product. Cuts extending to 1¼ inch in depth may be presented. It is imperative that carbide and steel shanks of adequate section be included in tool design. Mechanically held or brazed tools may be used, *Fig.* 7.

As shown in *Fig.* 3 the shell is rough turned to a predetermined contour at the open end of the shell. Deformation of the contoured OD cylindrical section by press forming results in a hollow ogival section with a predetermined wall thickness and volume. Maintaining the dimensions established for wall thickness and diameters is necessary to produce a shell having the proper weight and weight distribution.

The nosing operation may be performed hot or cold. On shell in which the reduction ratio does not exceed three, cold forming is generally used. For example, a 90-mm rough-turned shell is approximately 3.700 inches in diameter and the diameter at the small end after nosing is 2.500 inches. The

**Fig. 6. Inclusion of a plan edge angle as shown here will help to avoid failure of the cutoff tool when machining tubular sections.**



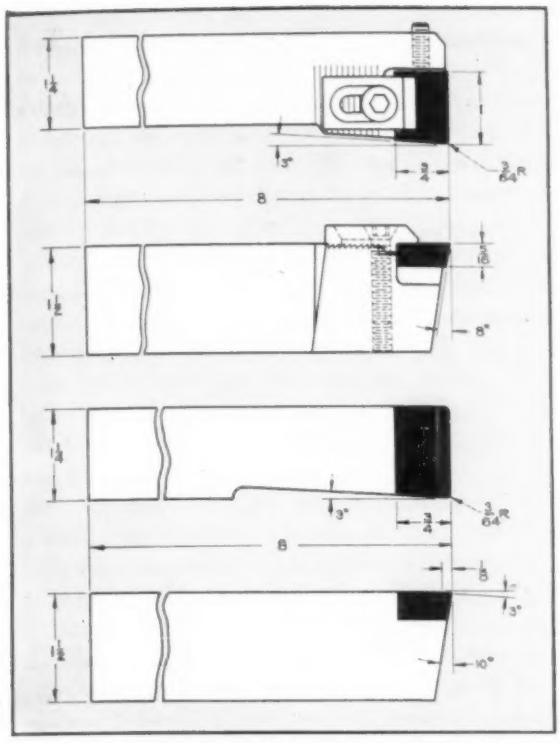


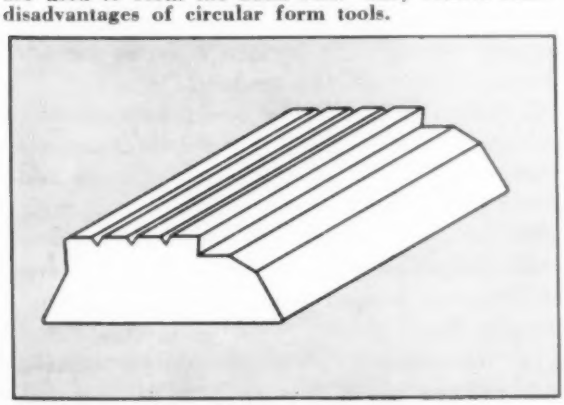

**Fig. 7. Mechanically held, top, or brazed tools, bottom, may be used for heavy cuts encountered in machining the base. Carbide and steel shanks of adequate section must be included in the tool design.**

reduction ratio then is $(3.7/2.5)^2$ or 2.2:1 and cold forming may reasonably be applied. However, a 155-mm shell having a rough-turned diameter of, say 6.25 inches must also be nosed to 2.500 inches at the small end. The reduction ratio then is $(6.25/2.5)^2$ or 6.2:1. Hot forming is generally applied in this case.

Cold-forming dies are internally contoured to form a shell with an ogive section which provides sufficient stock for finish turning. An average stock allowance of 0.045 inch per side is generally provided on the smaller shell and up to 0.125 inch per side on the larger ones. Good practice constitutes a greater stock allowance at the nose end than at the body diameter since eccentricities in the forming and boring operations may be introduced. Carbide dies and the use of commercially prepared soap base lubricants for cold forming result in maximum die life.

Tungsten hot-work die steels lubricated with a mixture of graphite and heavy black oil, swathed on the die after each pass, result in maximum die life when hot forming is employed. Controlled heating of the section to be formed is necessary to prevent buckling and improper flow of the metal.

**Fig. 8. High-speed steel flat form tools such as this are used to form the band seat. They relieve some disadvantages of circular form tools.**



## Finishing Operations

Subsequent operations, defined as semifinishing and finishing, involve removal of relatively small amounts of material with more rigid requirements as to surface finish and tolerances. Surface finish specifications are set so that range accuracy may be realized and safety in handling and loading is assured. Final variations in wall thickness and eccentricities must be kept to a minimum.

Providing a concentric wall with minimum variations in thickness necessitates chucking on the ID. Shell which has been formed or tapered on the OD by tapering, either hot or cold, will in all probability have some error introduced by accentuating discrepancies in the wall thickness during forming.

Maintaining location of the various body and ogive reference and dimensions plus controlling volumetric capacity requires that cavity length be accurately controlled. These conditions may be fulfilled by machining that portion of the cavity where the threads will later be formed, and by establishing a predetermined cavity length. Inasmuch as the cavity length is the dimension to be controlled, chucking facilities must locate the shell from the base of the cavity, and chuck or hold on the OD.

The nose ID may be machined with multiple-tooth cutters or single-point boring tools held in a boring bar. Single or multiple-spindle machines may be used. Chamfering and facing tools may be included in the same bar or facing and chamfering may be performed on separate stations. A copious supply of emulsified coolant is recommended to wash away chips and prevent jamming. General practice is to allow stock for a finish reaming operation prior to threading.

Finish turning the OD involves turning to close tolerances, maintaining surface finish requirements and contour turning the form required for accurate, repetitive range performance.

The OD of a shell may be divided into three sections: (1) The ogive, which is the nose end, having a curved section, the radius of which is

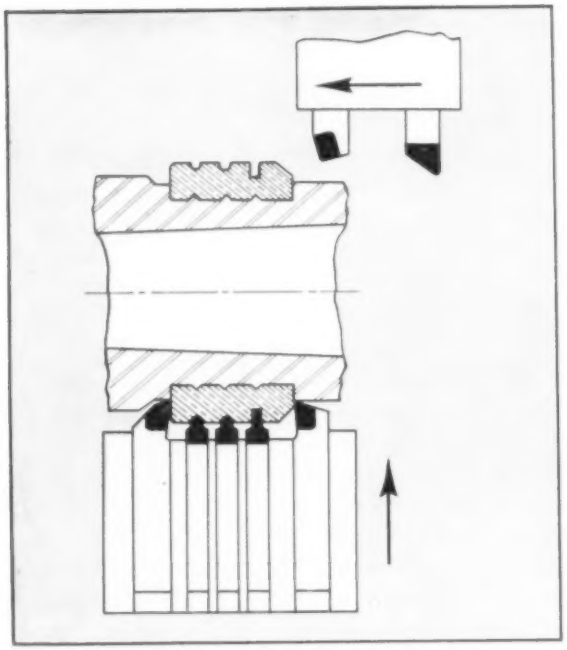


**Fig. 9. If the installation permits their use, ganged single-point tools may be substituted for flat or circular form tools.**

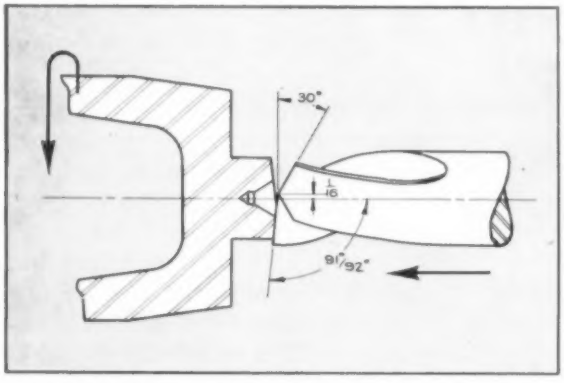



**Fig. 10. Drill ground for facing the boss prior to finish turning the base.**

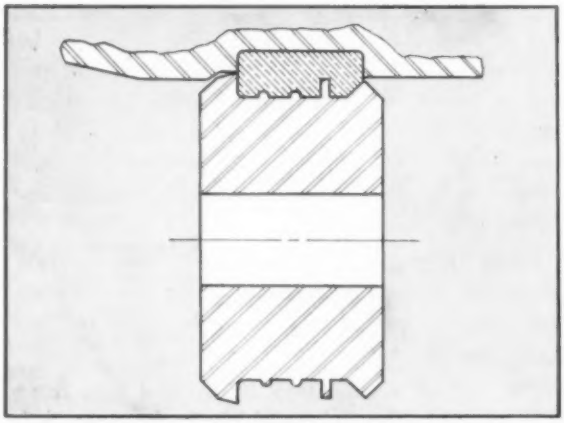


**Fig. 11. This circular form tool is used for forming the rotating band.**

larger than the diameter of the section being formed. (2) The body, which includes the bourrelet on which the shell is guided in the minor diameter of the gun and in the section between the bourrelets which is smaller in OD than the bourrelets, except for the rotating band which is compressed into a relieved section in the body just ahead of the rear bourrelet. The rotating band acts as a seal as the shell is forced into the breech block and imparts rotation to the shell for increased firing accuracy. Rotation is promoted by the impression of the rifling into the band as it is pushed into the forcing cone and barrel of the gun. (3) The boat-tail, a tapered section at the base end of the shell.

Multiple-tool, single-spindle, semiautomatic cam-controlled machine tools are generally used for the finish-turning operation. Maximum tool life and quantity as well as quality of production may be achieved by the use of Mechanigript holders utilizing inserts. Repetition of size and form is assured when tools become dull or require changing.

Since specified surface finish limits must be maintained, the feed per revolution and tool nose radius that will produce those requirements must be used. For example, a tool having a $^{3}/_{32}$-inch nose radius used in conjunction with a feed of 0.021 ipr will result in approximately a 250-micro-inch surface finish.

Those portions of the shell body which are not completed are the bourrelet which must be finish-ground to the required surface finish and the band seat which must be finished by plunge turning.

The portion of the shell on which the rotating band is crimped is called the band seat. It includes an annular recess machined with protruding angular tapered rings, subsequently knurled, on which the copper gilding metal or powder iron rotating bands are crimped, and a contoured relieved annular ring adjacent to the band seat to provide room for the displaced metal of the rotating band as it is forced into the rifling of the gun.

Forming the band seat may include forming with flat or circular form tools, plunge-fed into the work; skiving with flat form tools; or forming by single-point tools in a gang set.

Circular form tools may be high-speed steels or carbide. Certain advantages and disadvantages must be weighed to determine the type which best suits a specific tooling setup.

The advantages of circular form tools are simplified maintenance, accurate relationship between the diameters being formed, and minimum tool changing time.

The outstanding disadvantages are: (1) massive work and tool holding fixtures must be employed

to prevent chatter, particularly when wide sections are formed; (2) side clearance on the annular section is impossible and resharpening requires that a section equal in length to the arc of intersection of the major diameter of the work with the minimum diameter of the tool be removed; (3) fine feeds must be used to prevent chatter and provide escape for the chips.

Flat form tools relieve certain of the disadvantages of circular form tools, but fabricating may be complicated by the inclusion of dove-tail sections for holding purposes. If flat form tools are used, a design such as shown in *Fig.* 8 is recommended. Many installations permit the use of ganged single-point tools such as shown in *Fig.* 9. The use of preassembled cartridges and shadow form grinding facilitates their use, availability and maintenance.

Finishing the base end involves removing the boss into which the center has been formed for locating and holding purposes in the intermediate machining operations, and a finishing cut across the base to assure a clean flat surface, free from inclusions or cracks. A protective cover is later applied by welding or mechanical holding to further insure against the penetration of propellent gas or sparks into the cavity when the shell is fired. The base thickness must be controlled to meet the specified limits of shell weight and overall length.

Removing the hub or boss generally requires high-speed steel tooling. The surface speed is low on the largest diameter even when the shell is revolved at relatively high speeds and is zero at the center. Standard two-lip end mills or single-lip drills ground as shown in *Fig.* 10 may be used to advantage. Facing generally involves forming a flat surface at variable surface speeds. Inasmuch as the surface must be free of tears, free cutting tools capable of withstanding heavy compressive forces at the nose of the tool must be used. The force required to shear the material increases as surface speed is reduced and the removed material builds up and welds to the tool nose.

Threading the nose end and the base end internally or externally, as the design of the shell may dictate, is generally performed with collapsible or retractable die or chaser heads with high-speed steel chasers.

The minor diameter of internal threads may be sized with a multiple-tooth floating reamer, carbide-tipped or high-speed steel, or by chasers, the form of which includes the necessary dimensions for top tapping. Maximum tool life and quality threads are assured by the use of sulphur base cutting oil. Material specifications will govern the required hook or rake to provide free cutting tools. When extremely close thread tolerances must be maintained or threading to a shoulder is required, thread milling may be necessary. High-speed steel hobs are recommended.

The last of the machining operations generally performed is turning and forming the rotating band. The rotating band must be fabricated from a material having high ductility, low abrasive characteristics, yet strong enough to prevent its shearing during travel through the barrel of the gun. The most common material used for this application is gilding metal, although relatively pure copper and more recently powder iron bands are also used.

Since ductile materials are employed for this purpose, tool life is not a problem, but maintenance of form and condition is the element of prime consideration. Carbide, with its high abrasion resistance, is mandatory to insure continued, uninterrupted production.

Circular form tools, *Fig.* 11, may be used but low-cost, easily-maintained, ganged single-point tools as shown in *Fig.* 9 are recommended. Surface speeds of 500-600 fpm are not uncommon.

The methods and tool designs featured in this article are not to be construed as definite, requisite manufacturing procedures or tooling specifications. Rather they present the problems and conditions encountered in shell machining to serve as a guide in production planning and tool engineering.

---

# Powder Metal Method Cuts Cost In Half

A SURPRISING cost reduction was discovered by the Lux Clock Mfg. Co. when it reviewed production recently. The company, which makes small clock parts, has installed a battery of powder-metal presses, and reports a savings as high as 50 percent compared with previous manufacturing methods.

Prime economy factors possibly are the time and manpower involved. For one thing, the complex design of the clock parts prohibits economical production by machining, casting or stamping. For example, one clock piece made by Lux has 11 radii, two through-holes, and two or three different levels. Formerly this part was machined in several operations, two of which required assembly. Now it is made of iron powder in a single pressing operation on an F. J. Stokes press. At the same time the company claims considerable economy through materials cost reduction, since the process practically eliminates waste.

# Where's the Manpower Coming From?

## Apprenticeship may be a partial answer

EVERYONE AGREES that the manpower situation in the industrial field is—to understate the issue—pretty bad. Hundreds of employers are searching frantically for enough men to fill their shops, and coming up with little besides grey hair and ulcers.

As a result of the demand made by defense production needs, the call for skilled workers has never been so great. Records of the State employment service bear witness to how tight the situation has been. And machinists and tool and die makers are at the top of the list of craftsmen wanted. So it's a welcome thought that a few glimmers appear in the dark whirl, and one of these may well be the apprenticeship program.

Certainly there is nothing new about the idea, but it may provide a new angle to manufacturers needing help. Therefore a few particulars are in order. Tradition has associated apprenticeship with youth; nowadays, however, average age ranges well up in years, and it has become a training program for adults as well.

An occupation, to be recognized as apprenticeable by the Department of Labor should be one which:

1. Customarily has been learned in a practical way through training and work experience on the job
2. Is commonly recognized and clearly identified throughout an industry
3. Requires two or more years of work experience to learn
4. Requires related instruction to supplement the work experience (144 hours of such instruction during each year of the apprenticeship is usually considered a minimum)
5. Is not merely part of an apprenticeable trade recognized by the Bureau as recommended by the Federal Committee on Apprenticeship
6. Involves the development of skill sufficiently broad to be applicable in like occupations through an industry, rather than of restricted application to the products of one company

In setting up apprentice training, firms automatically fall into categories whose rules govern the formulation. Assuming no program exists at a given company, management must consider certain guiding factors. Most states and territories have regulations set up which industry is asked to follow. The standards and procedures have been established by agencies made up of an equal number of representatives of employers and employees, and sometimes a representative of the State Board for Vocational Education and a representative of the State Department of Labor. Their programs are prepared to conform to recommendations of the Federal Committee on Apprenticeship.

In a similar manner, joint committees may be set up on a local of even a plant level. In trades where both employers and employees maintain local organizations a local joint committee may be appointed to the particular trade. As in the similar groups on a broader level, a written program is established including standards of employment and training in addition to procedures for its supervision and administration. It establishes the apprenticeship term, schedule of work processes in which the apprentice is to be trained and the amount of classroom instruction in subjects related to his trade. In addition it should prescribe the manner in which written apprenticeship agreements should be executed and registered.

In another instance, it may not be practical for an employer to participate in a trade wide apprenticeship program. Then the employer and his employees, if the latter have an organization, may set up a plant joint committee and prepare, in writing, an apprenticeship program defining the conditions of employment and training for apprentices.

When employees in a plant do not have an organization, the employer may establish his own system and register it with the proper apprenticeship agency. An agency, of course, is made up of equal employer and labor representation, and has agreed upon training standards, therefore its review and registration of such an apprenticeship system, even though submitted by an employer only, is construed as meeting the basic policy of the National program.

# Tool Finishing Costs Reduced by Wet Blasting

By Eugene F. Anderson

Engineer
American Wheelabrator & Equipment Corp.
Mishawaka, Ind.

USE OF WET BLASTING for cleaning and surface operations in the manufacture of tools has resulted in important economies. Manual methods have been eliminated while tool life has been increased and tool performance improved.

Wet blasting is a cleaning process that provides close control over surface quality. The process utilizes fine mesh abrasives mechanically suspended in water and hurled upon the work at high velocity. Since abrasives from 80 to 2500 mesh are used, tolerances as close as 0.0001 inch are easily maintained. Tools can be blasted without dulling the cutting edges.

At Oling Tool Co., South Bend, Indiana, where job plating is done on all kinds of new and used tools, wet blasting has made it possible to save an average of 50 percent of former time and labor requirements for surfacing work. On individual items, such as drill bits, the saving has been as high as 80 percent.

## Advantages

Blasting is done in this plant both before and after plating. The unusual features of this plating process are: (1) A plate thickness of from 0.002 to 0.003 inch can be deposited while tolerances are held within ten-thousandths of an inch. (2) The tool can be put into service immediately, since regrinding operations are unnecessary. (3) With regrinding eliminated, tools are no longer subject to chipping, which sometimes occurs after regrinding is performed.

The work includes both new tools that are given a flash layer of plate and used tools which are plated in a reconditioning process to restore tolerances lost through use. In *Fig.* 1 the broach at the front has just been resharpened, while the tool in the center shows the surface after replating. At

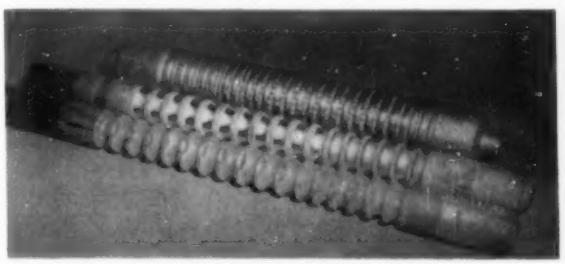


**Fig. 1. Stages of the reconditioning process are shown by these three broaches. Broach at front has been resharpened and degreased. Center broach has been replated. The one at the rear has been plated and blasted and is now ready for use.**

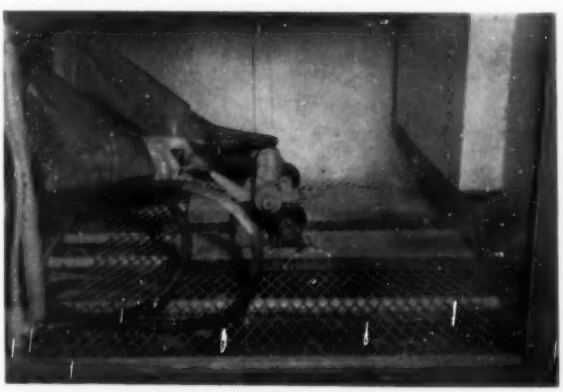


**Fig. 2. Wet blasting stage of the reconditioning process for a broach.**

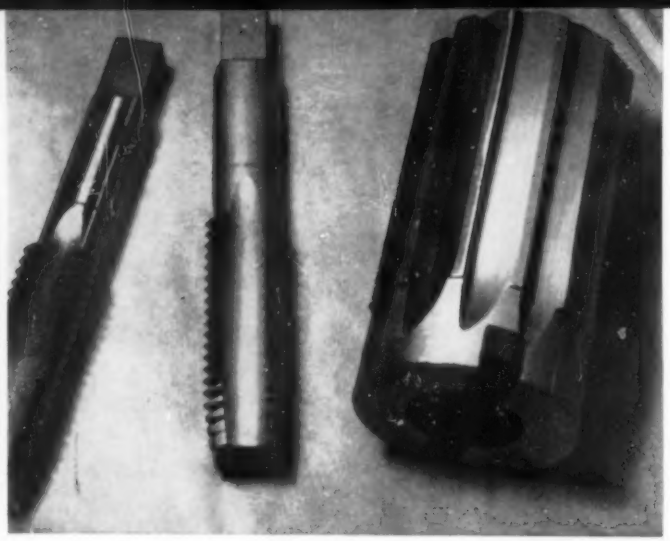


**Fig. 3. The two taps show the surface condition before and after wet blasting. The reamer at right has had half its surface cleaned by blasting while the left half was masked.**

the rear is a broach in its final condition after plating and wet blasting. The sequence of operations is the same in each case. Degreasing comes first, then a caustic dip for oil removal, followed by an acid dip to insure chemical cleanliness, particularly in the case of new tools which arrive from the factory covered with a tenacious nitriding scale.

### Produces Matte Finish

Wet blasting in a Liquamatte cabinet follows, *Fig.* 2. Because it has long been recognized that chrome plating is only as good as the surface to which it is bonded, particular attention is given to this operation. A matte-type finish is left on the tools, and since this means increased surface area for plating, a strong bond results.

The effects of wet blasting can be seen in *Fig.* 3. The tap at the left has just been removed from service while the one in the center has had the scale and carbon deposits removed. At the right, half of the reamer shown has been wet blasted while the other was masked to show the contrast.

At the same time, wet blasting also removes any burrs or feather edging which may have been left on the cutting edge during the sharpening process. This materially improves the quality of plating jobs. If burrs are on the tools, they are plated also. When such a tool is put into service, these burrs bend over, strip off and remove plating from the cutting edge.

After plating, wet blasting is again performed, this time to provide each tool with lubricant-retention properties. Normally, a tool with a smooth chromium plate surface needs to be broken in before it gives optimum performance because of the lubrication problem. Lubricating oil has a tendency to bead on smooth plate, but a wet-blasted surface is easily and thoroughly wet with a lubricant at once.

Because of this lubricating action, the galling frequently experienced with tools such as drills and reamers, especially when cutting plastic material or nonferrous metals, is greatly reduced. Tool loading often encountered in the machining of cast iron is also greatly decreased.

### Glare Reduced

A wet-blasted surface produces no glare under lights because matte surfaces diffuse light instead of reflecting it in one direction. Chromium-plated dials are a typical case where wet blasting after plating plays an important part in the quality of the product, *Fig.* 4. Numerals on a glossy surface are read with difficulty in extremely bright areas, but with very slight roughening of the surface, numerals or other engraved notations are read with ease. The close control held over surface abrasion keeps the engraved material from being altered or destroyed.

**Fig. 4. Wet blasting produces a matte surface which improves the visibility of numerals or graduations on surfaces as shown by these chrome-plated dials.**

# Machining Aluminum Alloys On Automatics

By Lester F. Spencer

Chief Metallurgist
Landers Frary & Clark

THE EXCELLENT MACHINABILITY of a number of the wrought aluminum alloys can be used to advantage in the production of intricate parts. The practices previously used in the machining of either brass or steel, however, cannot be applied successfully in the machining of the aluminum alloys; particularly the stronger types such as 24S-T3 and 17S-T4. Recommended practices established by suppliers have served as a guide from which deviations can be made to suit specific conditions.

One of the more important characteristics of this material is that of thermal expansion. When gaging a completed part, attention should be given to the proper temperature of the alloy at the time of machining so that contraction later will not make the parts smaller than gage. It has been found that taps and reamers should be made in accordance with the high side of the tolerance range to allow for this contraction which occurs during cooling from the machining temperature; this is especially important when a considerable amount of metal is removed rapidly.

In automatic machine work, alloys 11S-T3, R317-T4, 17S-T4 and 24S-T3 have excellent machinability. The first two alloys, 11S-T3 and R317-T4, have both lead and bismuth as free machining elements, and are preferred since the chips will break readily and a fine finish can be maintained at relatively high feeds. These alloys can be used with a variety of tool angles but to obtain best chip breakage, the rakes should be held fairly low. Alloys 17S-T4 and 24S-T3 both can be machined satisfactorily; however, due to the characteristic long stringy chip that is obtained, it may be advisable to grind chip breakers on some types of tools. These alloys also require a somewhat greater rake than that employed for the free-machining types. Alloys such as 2S and 3S in the full hard condition have a 'gummy' effect during machining and the long, stringy chips cause some difficulty in chip disposal. This can be alleviated to some extent by decreasing both cuts and feeds, providing liberal rake angles, smooth tool surfaces and keen cutting edges. The finish obtained when machining alloy 52S-H38 will not be as good as the finish when a comparable temper of 3S is used; however, it is drilled more easily.

Full advantage of the machining qualities of the heat-treated type of aluminum alloys can be realized only by utilizing higher machining speeds than those normally employed in machining other materials. This is assuming that the equipment is free from vibration. Brown and Sharpe automatic screw machines are used extensively for machining aluminum base alloys at Landers, Frary and Clark. In this type equipment, the bar to be machined is held rigidly in the spindle by a spring collet and rotated. Cutting operations are performed on the stock by cutting tools held in both the turret and the cross slides. Thus, the turret has six tool positions and is automatically indexed to bring each tool into position. The cross slides are two independent slides at right angles to the spindle which perform such work as circular forming, cutoff, etc. Both the turret and cross slides are moved to and from the work by specially designed cams to provide the proper feed to each tool.

## Machining Operations

**Turning Tools:** The success of the automatic screw machine in producing work with a high degree of accuracy, with a satisfactory surface finish and at a high production rate depends to a great extent on the selection and setting of the tools used for machine forming. Particular attention should be given to the preparation of tools to assure proper contour, smoothness of surface and keenness of cutting edges. Also, rigid support of the tool near

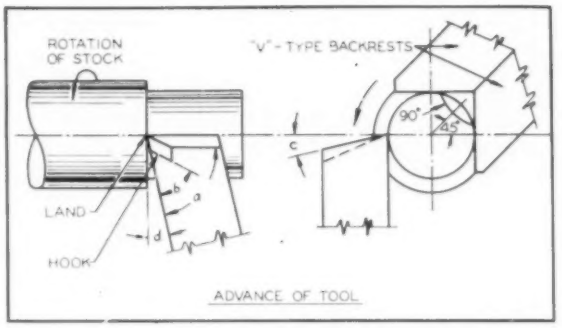
the cutting edge is necessary to minimize both vibration and chatter.

The balance turning tool, the plain hollow mill and adjustable hollow mill are considered as roughing tools for turning diameters. The balance turning tool is usually preferred since it can be adjusted to a wide range of sizes, is sturdy and is easy to grind and set. Occasionally this tool cannot be used when one or both cross slides are brought into action immediately after the rough turning. Both the plain and the adjustable hollow mills should be selected for turning long slender diameters due to the additional support given by the center hole which extends lengthwise through the center of the mill.

The box tool, which is used to a considerable extent in turning aluminum alloys, consists of blades mounted in a box-like frame and set tangent to the diameter of the work turned. It can be employed on all varieties of straight turning, either for roughing or finishing, and will turn one, two or three diameters simultaneously. It offers the following advantages: (a) adjustment over a wide range of diameters; (b) two or three tools for turning different diameters, facing shoulders or pointing of work; (c) support in the turning of long, slender work. When using a box tool the cutting blades should be carefully ground to a free cutting form and should be set on center. The tool should be clamped rigidly in its holder, and tangent to the diameter turned. The back rests should be carefully adjusted to the work so that they will bear evenly and give good support without springing the stock or forcing it against the blade.

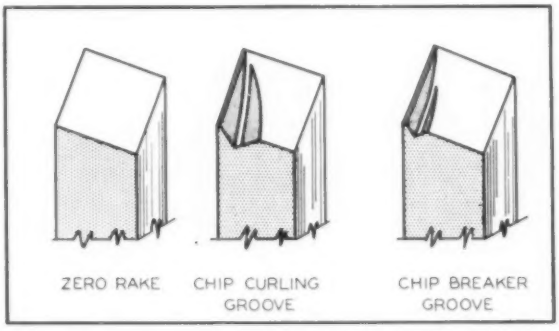
Since the box tool blades cut tangentially, one of the more important advantages of this type of tool is the fine adjustments which can be made. In setting these blades it is advisable first to reduce the diameter to the desired size by taking light trial cuts and then to set the blade centrally with the axis of the work. The adjustment for diameter is simple and effective in permitting fine settings. Thus, the blade rests upon a small rocker that acts as a fulcrum. Two screws hold the tool upon the rocker and by adjusting these screws the cutting point of the blade is swung up or down to the desired position.

**Supports:** In addition, proper setting of the back rests or work supports is important with both the V-type and roller back rests being employed. The V-type back rest, as indicated in *Fig.* 1, supports the work by means of a two-point bearing, the thrust from the tool being against both supports. This style of support should be used only for supporting turned diameters and should never precede the cutting tool, for it tends to produce in the turned work any irregularities that might exist in




*—Courtesy of Aluminum Co. of America*

**Fig. 1. When the box tool is set in position as shown at the left, the cut is tangential and fine adjustments are possible. At the right is a V-type backrest.**




*—Courtesy of Aluminum Co. of America*

**Fig. 2. Box tool blades may be of several different types. At the left is a tool with zero rake. The tool in the center produces a curling chip while the tool at the right has a groove which breaks the chip.**

the bar stock. For this reason the front edge of the back rest is set slightly behind the cutting point of the tool so that the turned surface of the work bears on the rest. As indicated in *Fig.* 1, this type of back rest may be split lengthwise into two parts at the bottom of the V, each end of which is milled at an angle of 45 degrees. When assembled in pairs, the included angle of the back rest is 90 degrees and as one end is milled to form a larger rest than the other, they may be turned end for end to employ either the large size rest for large diameters or the small size rest for small diameters. The back-rest should be made of a good grade of hardened tool steel.

**Tool Angles:** As shown in *Fig.* 1, the blade is not set at right angles with the axis of the work, but is set back on the rear end for clearance; this angle *d* being approximately eight degrees for all blades. A cutting angle, *a*, in the machining of either 11S-T3 or R317-T4 is approximately 82 degrees along with a zero top rake, *Fig.* 2. A small angle, *c*, may be ground into the blade to provide side rake, giving a slicing action to the cutting edge for freer cutting. In no case should this angle be negative, i.e., the top face of the cutting edge must not be in advance of the center line shown in *Fig.* 1. In machining the other alloy types, it is advisable

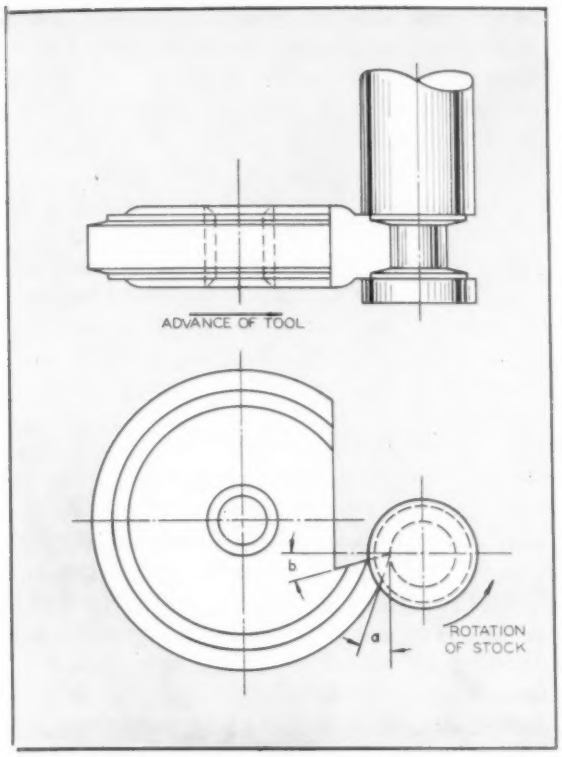



**Fig. 3. Circular form tools used on the cross slides.**

to employ a hook with a rake of 45 to 55 degrees and an included angle of 27 to 37 degrees, as indicated in *Fig.* 2.

For light cuts at low feeds, the hook may come to the cutting edge without too much danger of breaking the edge; however, it is advisable to have a slight land between the cutting edge and the hook if either high feeds, deep cuts or high surface speeds are employed. The values for land widths as given in TABLE 1 can be used as a guide. It should be remembered that a narrow hook coils the chips tighter, which increases the tendency of these chips to break. On the other hand, a wide hook produces more continuous and loosely wound chips.

**Cutting Speeds:** As mentioned previously, high surface speeds can be employed in machining aluminum alloys; a value approaching 700 sfm may be used in turning rounds with a box tool. In the event that either hexagon or square stock is being machined, this speed will vary between 300 and 450 sfm. The choice of feed to be used will be governed by such variables as the depth of cut, the tolerance and the surface finish. The values suggested in TABLE 2 will be useful as a guide. The feeds as given are to maintain tolerances on the turned diameter (1) not closer than:

± 0.0005 inch for diameters under 3/16 inch.
± 0.001 inch for diameters of 3/16 inch to but not including 1 inch.
± 0.0015 inch for diameters of 1 inch to but not including 1½ inches.
± 0.002 inch for diameters of 1½ inches to but not including 2 inches.

For closer tolerances than these, the feeds may have to be reduced. Also, the depth of cut should not reduce the diameter more than 50 percent for these tolerances. For greater reduction two cuts may be necessary. Surface finish of better than 5 microinches have been obtained on diameters turned with a box tool when using roller-type rests and tungsten carbide cutting blades. Fine finishes can also be obtained with the V-type rests, with longer life, if the rests are also cemented carbide.

**Circular Form and Cutoff Tools:** Circular forming and cutoff tools are the only cutting tools generally used on the cross slides, and either one or both types are employed on practically every job. As shown in *Fig.* 3, a circular form tool consists simply of a disk, the periphery of which is formed to cut the required shape while the deep notch cut into the periphery is to obtain a cutting edge. The only difference between forming and cutoff tools is the purpose for which they are used; cutoff tools are usually rather thin and do not do much work other than parting the finished piece from the bar. A forming tool is used for shaping or turning part or all of the body of the piece.

Because of their circular shape, these tools are not difficult to form and once formed can be ground over and over again like a formed cutter without altering the shape. The use of a circular form tool has the advantage of simplifying the type of gage required to test the accuracy of the finished part.

**Table 1—Guide for Land Widths**

| Depth of Cut (inches) | Feed (ipr) | Land Width (inches) |
|---|---|---|
| Less than 1/32 | Less than 0.005 | 0.0 to 0.005 |
| Less than 1/32 | 0.005 to 0.016 | 0.005 to 0.010 |
| 1/16 | 0.007 to 0.012 | 0.005 to 0.0125 |
| 1/8 | 0.007 to 0.010 | 0.005 to 0.015 |
| 3/16 | 0.006 to 0.009 | 0.005 to 0.0175 |
| 1/4 | 0.005 to 0.008 | 0.005 to 0.020 |

*—Courtesy of Aluminum Co. of America*

**Table 2—Suggested Feeds for Box Tools**

| Finished Size (inches) | Depth of Cut (inches) | Aluminum Alloys Except 11S-T3 (inches) | 11S-T3 (inches) |
|---|---|---|---|
| 1/4 and more | 1/32 | 0.012 | 0.015 |
| 1/4 and more | 1/16 | 0.010 | 0.0125 |
| 1/4 and more | 1/8 | 0.008 | 0.010 |
| 1/4 and more | 3/16 | 0.007 | 0.009 |
| 1/4 and more | 1/4 | 0.006 | 0.008 |
| 1/8 to 1/4 | 1/32 | 0.010 | 0.012 |
| 1/8 to 1/4 | 1/16 | 0.009 | 0.010 |
| 1/8 to 1/4 | 1/8 | 0.007 | 0.009 |
| 1/16 to 1/8 | 1/32 | 0.007 | 0.008 |
| 1/16 to 1/8 | 1/16 | 0.006 | 0.007 |

*—Courtesy of Aluminum Co. of America*

Thus, wherever possible, a circular form tool for forming an entire length of section is preferred. However, this is governed somewhat by the length of the section to be formed in relation to its diameter, since the pressure of a wide forming tool may become so great that the part machined will either twist off or spring. Thus, for alloy types 11S-T3, R317-T4, 53S-T4 and R353-T4, the length of the form shall not exceed 2¼ times the smallest diameter whereas alloy types 17S-T4 and 24S-T3 permit a form whose length is 2½ times the smallest diameter.

Similarly, if the form tool is used to cut with its outer end more than this ratio from the collet and the stock is unsupported, difficulty may be experienced, especially if a heavy form cut is taken at the outer end of the stock. A counteracting support which equalizes the cutting pressure as much as possible should be set close to the cut. Where this supporting action can be provided, the length of forming cut with a circular form tool may be increased to four or five times the smallest diameter.

Circular form tools, *Fig.* 3, are set with the centerline of the tool ahead of the centerline of the stock, providing a clearance angle, *a*, below the cutting edge. The rake angle employed will vary with the alloy, the type of operation and with the feeds and speeds employed. This value usually varies from five to ten degrees. When large quantities of metal are removed in a roughing operation or when softer or more 'gummy' alloys are machined, such as 2S and 53S, somewhat larger rake angles may be advantageous. This additional rake is usually obtained by grinding a hook behind the cutting edge, leaving as narrow a land as possible in order not to destroy the shape of the tool. The surface speeds that are employed are similar to those employed in box tool turning, these speeds being based on the largest stock diameter. The feeds that are employed will vary in accordance with the alloy, the size of cut, the finish desired and the tolerance. This value varies from 0.0035 inch per revolution when making cuts ⅛ to ¼ inch wide to only 0.0015 inch for one-inch width cuts.

As mentioned previously, both the forming and cutoff tools work from the cross slides, the cutoff tool either operating on a separate slide or combined with the form tool to chamfer the end of the stock. At times the cutoff tools form the piece as well as cut the piece from the bar. *Fig.* 4 illustrates a variety of applications of both forming and cutoff tools.

In *Fig.* 4*a*, both cross-slide tools are forming tools, and the piece is fed out before it is cut off. This method can be used when there is a shoulder where the portions formed by the two tools can join, with the joint blending within the design. The tool on the back cross slide must not start to cut as soon as the one on the front slide or the diameter near the chuck will be reduced so that the piece will not be stiff enough to withstand forming at its outer end. In *Fig.* 4*b*, the forming tool on the front slide rounds the corner at the top of the screw after the threading operation, and the cutoff tool forms the end of the next piece while cutting off the one that is completed. *Fig.* 4*c* shows a forming tool which simply squares up the head of a piece previously turned by a turret tool. The forming tool laps around the back corner of the head to remove any burr caused by the cutoff operating from the back slide. Both tools operate simultaneously.

All forming and cutting off in *Fig.* 4*d* is done with the front cross slide tool; the rear tool slide carries a cross drilling attachment for drilling a hole through the piece. *Fig.* 4*e* indicates how one end of a piece is finished with a cutoff tool while

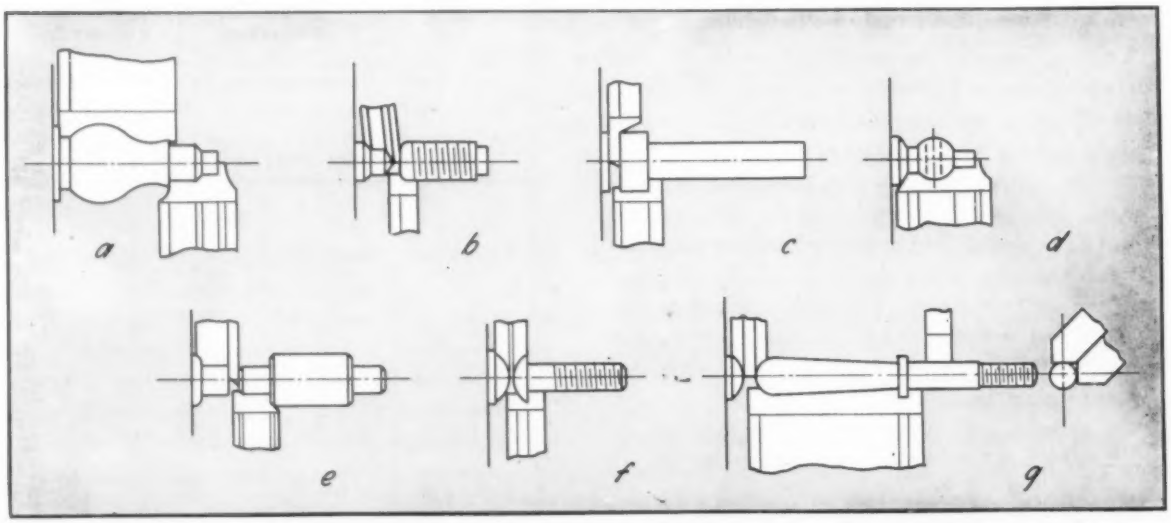



**Fig. 4. Circular form and cutoff tools perform operations such as the seven shown here.**

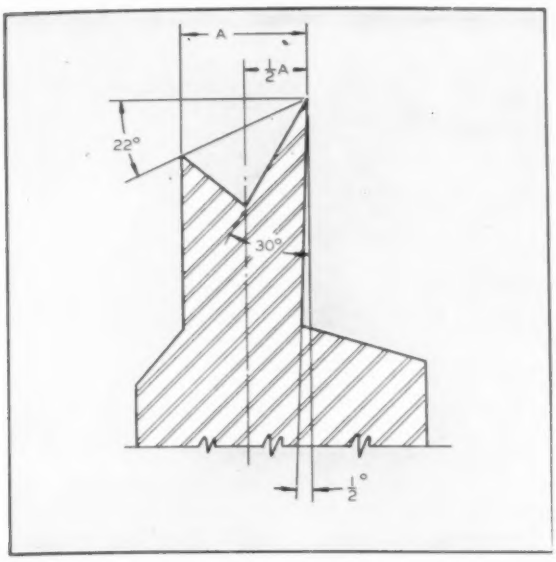



**Fig. 5. A cutoff tool with two points will prevent a burr being forced into the hole when cutting off sections of tubing.**

the other end is produced by the forming tool on the front side after the bar has been fed out. In *Fig. 4f*, the forming tool on the front slide is producing part of the head and squaring up under the head. The balance of the form on the head is carried on the cutoff tool, which must be designed and set to blend with the curve produced by the forming tool. *Fig. 4g* illustrates a method of supporting the outer end of a long slender piece. The V-type back rest is held in the turret and supports the work on the turned diameter back of the threaded portion.

The cutoff tool may also be of the straight blade type which is employed when no auxiliary operation other than separating the machined part from the bar is required. A front angle of approximately 22 degrees can usually be employed; however, it may be necessary that this angle be as low as 8 degrees for exceptionally deep cuts at heavy feeds. Rake angles of straight cutoff tools are set by the tool holder, usually from 5 to 15 degrees. One advantage of straight blade cutoff over circular cutoff tools is that a liberal side clearance is possible. When cutting tubing, a design such as illustrated in *Fig. 5* is employed which will aid considerably in preventing a burring action inside the tube. Suggested tool widths given in TABLE 3 are suitable for either straight cutoff through rod or combined form and cutoff.

Circular form tools should have a ½-degree side clearance in back of the point to reduce rubbing which may mar the finish. However, any rubbing that does occur can be minimized by providing a good surface finish on the sides of the tool, accurately setting the tool and providing an ample supply of cutting fluid. The front clearance on these tools is obtained by setting the centerline of the tool ahead of the centerline of the stock. The rake employed on circular cutoffs will vary with the alloy; a value of 0 to 3 degrees is employed for the free machining types, 11S-T3 and R317-T4, while a value varying from 5 to 10 degrees is normally employed on other alloys. As in box tool design, the use of a hook behind the cutting edge is recommended in order to obtain additional rake when machining the more 'gummy' alloys. A V-type hook is used on a circular tool, whereas a straight cutoff will have a chip groove ground in with a pencil wheel to keep the front edge of the groove parallel to the cutting edge.

Surface speeds employed in a cutoff operation are the same as those recommended for box-tool and circular forming. The tool feeds as recommended and tabulated in TABLE 4 can be used as a guide. On large machines with sturdy construction and large, rigid tool holders, the feeds may be increased to 0.006 to 0.008 inch per revolution. Often it may be advisable to reduce the feed at the end of the cut to hold burrs to a minimum.

**Auxiliary Tools for Turning:** Combination knee tools are used in the turret of screw machines chiefly for taking roughing cuts on short work in preparation for subsequent use of the circular forming tool. Since knee tools require less clearance space than either balance turning tools or box tools, they are preferable for this type of work. These tools permit right- or left-hand turning with the

**Table 3—Suggested Cutoff Tool Widths**

| Cut Depth (inches) | Cutoff Only | | Combined Form and Cutoff | |
|---|---|---|---|---|
| | Round (inches) | Square or Hex (inches) | Round (inches) | Square or Hex (inches) |
| 0.0 to 0.125 | 0.047 | 0.062 | 0.047 | 0.047 |
| 0.126 to 0.1875 | 0.062 | 0.093 | 0.047 | 0.062 |
| 0.188 to 0.312 | 0.093 | 0.125 | 0.062 | 0.093 |
| 0.313 to 0.500 | 0.125 | 0.187 | 0.093 | 0.125 |
| 0.501 to 0.687 | 0.187 | 0.250 | 0.125 | 0.187 |
| 0.688 to 1.250 | 0.250 | 0.250 | 0.187 | 0.250 |

*—Courtesy of Reynolds Metals Co.*

**Table 4—Suggested Feeds for Cutoff Tools**

| Width of Cut (inches) | Feeds (ipr) | |
|---|---|---|
| | Circular Cutoff Tool | |
| | Free Machining Alloys* | Other Alloys |
| 3/64 to 1/16 | 0.0035 | 0.0030 |
| 3/32 to 1/8 | 0.0040 | 0.0035 |
| 5/32 to 1/4 | 0.0045 | 0.0040 |
| | Straight Cutoff Tool | |
| 1/16 to 1/8 | 0.0035 | 0.0030 |

* Those alloys containing 0.5 percent of lead and bismuth

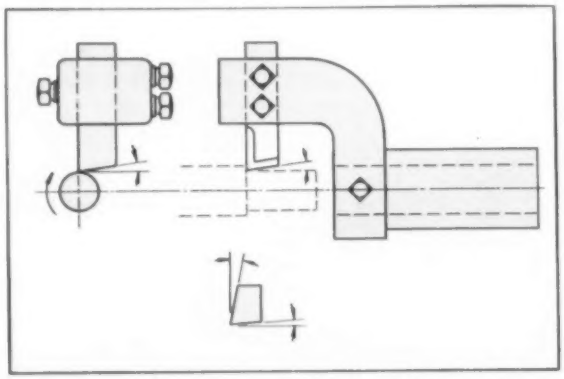
*—Courtesy of Aluminum Co. of America*

same tool by means of a simple adjustment. By changing the adjusting screws from one side of the body of the tool to the other to accommodate one of two blades, the tool is adapted quickly to the direction of rotation desired. The thrust from the cut falls against two setscrews, the remaining setscrew being used in the center position opposite.

The cutting blade has fine adjustment and is ground for turning a square shoulder perpendicular to the centerline of the stock. The shank is arranged to hold a centering tool, counterbore, drill or other tool for simultaneous internal cutting. The tool is placed in the turret with the cutting point at the most convenient position on the circumference of the work. Best practice has the blade cutting from either the top or bottom to allow ample clearance for the cross-slide tools.

In general, the clearance angles, *a*, *c* and *d*, *Fig.* 6, are approximately 15 degrees, while the top rake angle, *b*, is from 15 to 20 degrees. As previously stated for other tool applications, the free machining aluminum alloys may require less rake than that specified. In some instances, a small radius at the point of the tool may improve tool life and surface finish. The feeds employed will vary. Normally, feeds from 0.020 to 0.008 inch per revolution are used for cuts from $\frac{1}{32}$ to $\frac{1}{4}$ inch deep. As in box tool design, chip breakers may be employed with a small land being between the groove and the cutting edge. The speed of operation is similar to that for box tool work.

The combination swing tool, which can be adapted for either right or left-hand turning, is designed for use in the turret position. It can be employed for operations such as straight, taper or irregular turning for which either the box tool or the circular form tool is not applicable; a cutoff tool when both cross-slide positions are occupied; internal work such as recessing, boring and chamfering. In the first two applications, the tool is termed an external swing tool, whereas in the latter



—*Courtesy of Brown & Sharpe*

**Fig. 6. Knee tools are used for taking roughing cuts in preparation for subsequent use of the circular forming tool.**

**Table 5—Suggested Tool Widths for Cutoff Through Tubing or into Drilled Holes**

| Stock Diameter (inches) | Depth of Cut (inches) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0.0 to 0.125 | 0.126 to 0.187 | 0.188 to 0.312 | 0.313 to 0.500 | 0.501 to 0.687 | 0.688 to 1.250 | 1.251 to 1.875 |
| | Tool Width (inches) | | | | | | |
| 0.0 to 0.500 | 0.047 | 0.062 | 0.093 | .... | .... | .... | .... |
| 0.501 to 0.750 | 0.062 | 0.062 | 0.093 | 0.125 | .... | .... | .... |
| 0.751 to 1.250 | 0.093 | 0.093 | 0.093 | 0.125 | 0.187 | .... | .... |
| 1.251 to 1.750 | 0.125 | 0.125 | 0.125 | 0.125 | 0.187 | 0.250 | .... |
| 1.751 to 2.750 | 0.187 | 0.187 | 0.187 | 0.187 | 0.187 | 0.250 | 0.250 |
| 2.751 to 3.750 | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 |

—*Courtesy of Aluminum Co. of America*

**Table 6—Suggested Feeds for Skiving Tools**

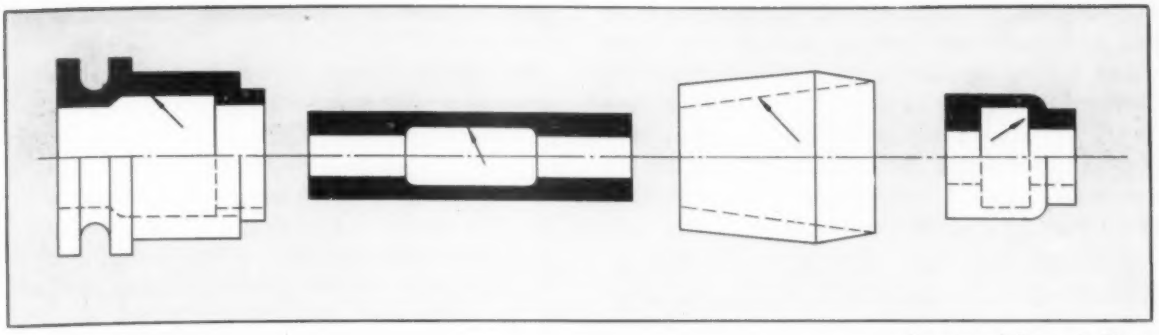
| Ratio of Unsupported Length of Stock to Diameter Before Skiving | Ratio of Unsupported Length to Smallest Turned Diameter | Depth of Cut (inches) | Feed (ipr) |
|---|---|---|---|
| 6 | 24 | 0.150 | 0.002 |
| 6 | 12 | 0.125 | 0.004 |
| 4 | 10 | 0.062 | 0.008 |
| 0.36* | 0.68 | 0.250 | 0.010 |
| 3.1 | 3.2 | 0.005 | 0.012 |

* No support used —*Courtesy of Aluminum Co. of America*

application, the term employed is the internal swing tool. Typical examples of internal work are shown in *Fig.* 7, the arrow indicating the area to be finished by this type tool.

Skive tools are usually employed in the machining of nonferrous materials where a wide formed surface running down to small diameters is required and the standard forming tool is not applicable. Skive tools are side working and are set to cut on a tangent, *Fig.* 8. The form is machined into the face of the tool for its entire length. The front of the tool is ground at an angle, termed the approach angle, and as the tool advances, only a small portion of the stock is turned at one time. The advance point of the tool is usually placed at the outer end of the piece so that the stock is supported by its full diameter between the collet and the cut. These tools may be ground with several approach angles so that the smallest diameter is turned last.

The approach angle generally will be approximately 35 degrees, but on large diameters a smaller approach angle may be used to advantage. The rake angle varies as the tool advances into the work. The cutting angles will vary from 65 to 70 degrees and the speed of operation will be similar to that for box tool work. Tool feeds depend upon the amount of tool pressure, finish desired and resultant spring. This in turn depends upon ratio of unsupported stock length to stock diameter before skiving, ratio of unsupported stock length to smallest turned



—Courtesy of Brown & Sharpe

**Fig. 7. Four examples of recess or internal swing tool operations.**

diameter, size of approach angle, shape of part and position of stock supports. The values in TABLE 6 can be used as a guide.

The centering and facing tool is similar to the knee tool with the exception that the blade cuts tangentially like a box tool blade. Its purpose, as the name signifies, is to face off the stock to the required length and center it at the same time. This tool is usually employed when the turret positions are occupied with other tools. The blade is set at an angle from 8 to 12 degrees with the face of the spindle, and a top rake angle from 10 to 15 degrees is employed. A feed of from 0.001 to 0.003 inch per revolution is used on wide cuts where both a flat surface and a fine finish is required. For light facing operations, such as breaking corners or chamfering, higher feeds may be permissible.

In this combination tool, a fluted centering tool of comparatively large diameter is usually employed in the holder, the included angle of the point being less than the included angle of the drill that follows. After the turning blade has been set on center to face the work to the proper length, the centering tool is clamped on the shank. Considerable care is required to grind and set this tool in a fixed holder and have it center the work concentrically.

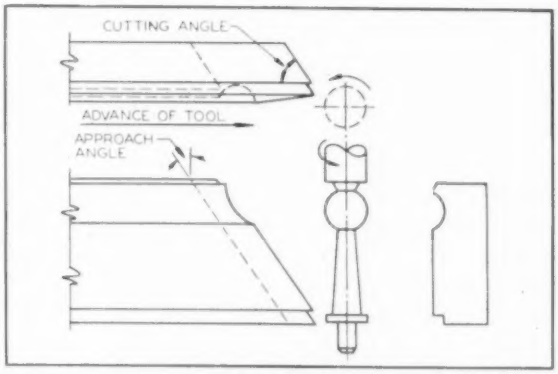
## Drilling Operations

**Drills:** In a drilling operation on automatic screw machines care must be taken to keep the drill sharp so that it will cut freely, and to flood it well with a lubricant to keep it cool and wash the chips from the hole.

Standard twist drills are usually employed for drilling holes up to six diameters deep. For deep hole drilling, commercial drills with two straight flutes are often used, since the chips work out of the hole much better than with spiral fluted drills. This type of drill is recommended when drilling alloy types 17S-T4, 24S-T3 and 11S-T3. The half-round drill also gives excellent results in drilling deep holes since this design frequently prevents drill breakage due to clogging of chips. When using a drill of this type, it should be preceded by the usual twist drill, which should start the hole to a depth of about two or three diameters of the half-round drill.

As in the drilling of other materials, the web thickness of the drill should be reduced at the point as the drill is ground back. This will reduce the end pressure on the drill, since the chisel point does not cut but compresses the metal ahead of it. No set rule can be given for the correct web thickness, experience being the best guide. A centering operation always precedes drilling of the hole and for this purpose commercial center drills are used. Sometimes old twist drills are used for centering after they have become too short for other uses. The center drill is simply a short stiff twist drill, the point of which is ground as thin as possible consistent with reasonable working qualities. This produces a drill that enters the metal easily and on a true center line.

If the holes to be drilled are not too deep, a standard included-angle lip of 118 degrees will give satisfactory performance while larger included lip angles are used when deeper holes are being drilled. When several drills are used in the same hole, each succeeding tool should have a slightly blunter angle than the preceding one so that it may be centered at the periphery of the cutting edges. The clearance angle behind the cutting edges should be from 12




—Courtesy of Aluminum Co. of America

**Fig. 8. Skive tools machine nonferrous materials where a wide formed surface running down to small diameters is required and the standard forming tool is not applicable.**

to 20 degrees, this value varying with both the type drill and the included cutting lip angle. The rake angles are set by the spiral angle of the drill. Standard twist drills have a value of 20 to 25 degrees; high-speed drills, an angle from 40 to 43 degrees; slow spiral drills, an angle of 7 to 15 degrees. For both the straight flute and half-round drills, the rake angle is zero.

In drilling deep holes, there is a limit of depth to which a drill enters the stock. This precaution is necessary to prevent both flute jamming and drill breakage. Recommended values are given in TABLE 7. Drill speeds are governed usually by the diameter drill employed. A value of 600 fpm is recommended for drill diameters less than 1 inch, a value of 550 fpm when the drill diameter is between 1 and 1½ inches, and a value of 450 fpm when the drill diameter is over 1½ inches. Drill feeds are dependent upon a number of factors; however, the values in TABLE 8 can be used when drill diameters up to ¾ inch are employed. For closer tolerances and better finish, lower feeds should be employed. This is also true when drilling thin-walled parts.

**Reamers:** Reamers for working these alloys should have large flutes to allow passage of chips and, in addition, should have sufficient flutes to give the tool adequate support. On straight holes, both the straight fluted and the spiral reamer work well. The latter type has the spiral to obtain a positive rake. The spiral fluted reamer can be used to advantage in reaming deep holes, especially those made with a flat drill. This drill leaves chips in the hole which a spiral reamer will remove, whereas a straight fluted reamer will often carry around some of the chips and either rough up the hole, or become so clogged that it will seize and break off. For finishing tapered holes, reamers with spiral flutes, which have an opposite direction to the direction of cutting, are generally used, since these reamers have less tendency to hog into the cut or to chatter.

Where close tolerances are not required, standard twist drills having an included cutting-lip angle of 118 degrees and with a 12-degree clearance back of the cutting edge may be used as reamers. The straight reamer type has a 5 to 10-degree rake measured radially, a clearance angle of 10 degrees behind the cutting edges, a margin along the flutes of 1/64 to 1/16 inch in width, and is generally ground with a 45-degree chamfer. In reaming a tapered hole, both the rake and clearance angle will be governed by the angle and depth of the tapered hole. Usually, a radial rake angle of 5 to 10 degrees along with a clearance angle of 8 to 15 degrees, is satisfactory. Since the clearance is usually ground straight or slightly hollow, it may be necessary to grind a secondary clearance to prevent the back of the land from rubbing on the side of the hole.

A sufficient amount of metal must remain after drilling so that the reamer will cut rather than burnish, usually from 0.006 to 0.016 inch of stock, depending upon the size of the hole. On a depth of cut of 0.003 to 0.004 inch, with the diameter of hole less than ⅛ inch, a feed of 0.007 to 0.010 inch per revolution is employed. Where the diameter of hole is greater than ⅛ inch, the depth of cut may be increased from 0.004 to 0.008 inch with the feed varying from 0.010 to 0.020 inch. Taper reamers usually have a feed varying from 0.002 to 0.005 inch per revolution. Reamers are normally made from 0.0005 to 0.001 inch below the top limit of the hole diameter.

The floating holder is used extensively for holding drills, reamers, counter-bores and similar tools in the turrets of screw machines and provides a suitable means of accurately centering these cutting tools with the work. The cutting tool is mounted in the head of the tool holder, either directly or by the use of a bushing, and is clamped securely in place by a setscrew. The standard drill holder is clamped directly to the turret position and can be used where the limits of accuracy are not close since it is easier and quicker.

**Table 7—Maximum Depth per Drill Entry**

| Drill Type | First Drill (in drill diameters) | | | Second Drill (in drill diameters) | | |
|---|---|---|---|---|---|---|
| | 1st Entry | 2nd Entry | 3rd Entry | 1st Entry | 2nd Entry | Sub-sequent Entry |
| Standard | 4 | 1½ | ¾ | ... | ... | ... |
| High Spiral, Straight Flute, Slow Spiral | 5 | 2 | 1 | 1½ | ¾ | ½ |

*—Courtesy of Aluminum Co. of America*

**Threading and Tapping:** Since the shear strengths of the aluminum alloys are somewhat lower than that of steel, threaded lengths should be increased from 10 to 40 percent as compared to steel threads, the upper limit given being applicable to the softer aluminum alloy types. Very fine threads and those having a sharp V contour should be avoided because of seizing tendencies. A rounded or trapezoidal thread will usually cause no trouble on this score if smoothly cut.

Both the solid and self-opening threading tools may be employed. The solid type requires a reversal of spindle direction to back the tool from the work after threading. The latter type, as its name implies, opens up after the piece has been threaded and will clear the work without changing either the speed or the spindle direction of movement. When a par-

**Table 8—Suggested Drill Feeds**

| Drill Diameter (inches) | Tolerance (inches) | Feed (ipr) | |
|---|---|---|---|
| | | Free Machining Alloys* | Other Alloys |
| 0.0625 | ± 0.0015 | 0.004 | 0.004 |
| 0.125 | ± 0.002 | 0.012 | 0.010 |
| 0.187 | ± 0.002 | 0.0144 | 0.012 |
| 0.250 | ± 0.002 | 0.0168 | 0.014 |
| 0.375 | ± 0.0025 | 0.0204 | 0.017 |
| 0.500 | ± 0.0025 | 0.0204 | 0.017 |
| 0.750 | ± 0.003 | 0.0204 | 0.017 |

* Those alloys containing 0.5 percent of lead and bismuth

*—Courtesy of Aluminum Co. of America*

ticularly smooth thread is required, it may be necessary to employ both roughing and finishing dies. In addition, absolute alignment of the work and the tool is essential and a copious amount of cutting fluid must be supplied to both components.

Milled, tangential and circular chasers may be employed in threading with a 20 to 22-degree chamfer angle. It has been found in practice that chasers which are not more than 0.012 inch ahead of center will produce good threads, but that chasers ground closer to center will result in chatter, shaved threads and variation in size. To insure best results, chasers should fit die heads with a minimum amount of play. The top rake of 20 to 30 degrees will provide good threads, the choice of rake being dependent upon the style of chaser employed. Thus, milled chasers will have a top rake angle of 20 to 25 degrees, tangent chasers approximately 30 degrees, and circular chasers approximately 25 degrees. These values are based on the heat-treated alloys. The softer and more ductile aluminum alloys require larger rake angles.

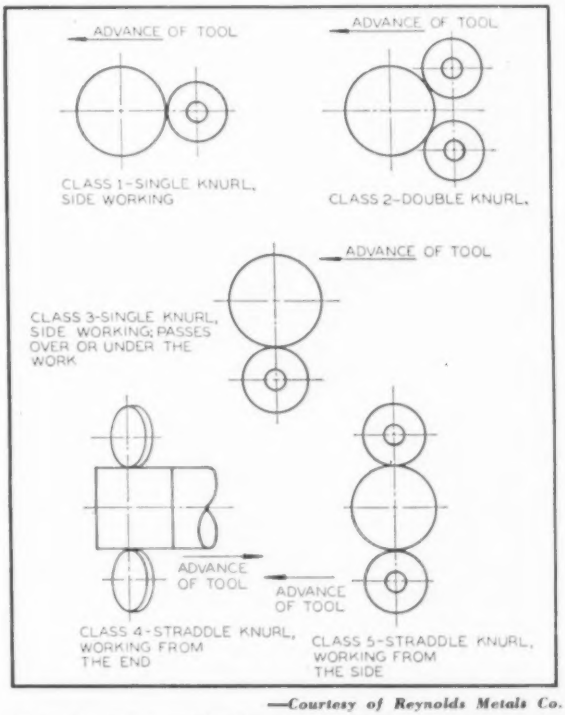
The clearance angle employed will depend upon such factors as the type of chaser used, the chaser mounting procedure, the chamfer angle, and the diameter of the stock. This angle is important, since too little clearance will cause rubbing, pickup of metal and rough threads. On the other hand, excessive clearances may cause chatter, poor threads at the start or tapered threads. Generally, larger clearance angles are used for large diameter work and short chamfer angles, and small clearance angles for smaller diameter work and longer chamfer angles. Since the thread relief angle and the setting of the chasers in the die head vary with the make of the die head, the manufacturers' recommendations for the exact angle should be followed.

For most of the aluminum alloys, chasing tools for use in self-opening die heads should be ground with about a 20 to 30-degree hook and should be set sufficiently above the axis of the work to give an effective top rake of 30 to 40 degrees. This hook, when used, should extend the length of the chamfer and include the first two threads, and should not be any deeper than is necessary to secure the proper cutting action. The use of this hook is particularly advantageous in machining the softer and more ductile alloys.

Aluminum may be threaded at high speeds which are limited only by the available power, by the strength of the threading tool and its ability to hold a given length, and by the pitch of the thread. In general, a value of 200 sfm can be used when the thread pitch is 9 or coarser, 250 sfm when the thread pitch is from 9 to 14, 325 sfm when the thread pitch is from 14 to 18, and 475 sfm when the thread pitch is 18 and finer.

Since tapping is usually a follow-through of either drilling or reaming, its success is directly related to the condition of the hole. Accurate alignment of tap and work is essential, and in some instances a floating holder may be employed. However, this may cause a bell-mouthed hole, especially when tapping the softer aluminum alloys. Possibly the greatest reason for torn threads or broken taps is the selection of an incorrect tap drill diameter. Also, the tap should not be used to remove any more metal than is absolutely necessary.

The land width depends on the pitch of the thread, and should be only wide enough to support the tap in the hole, since friction increases as the land width increases. Generally, the width of each land should be 1½ to 3 times the pitch of the thread, regardless of the diameter. For most work, taps with straight flutes are used. Spiral taps with a right-hand spiral may have a tendency to shave the




*—Courtesy of Reynolds Metals Co.*

**Fig. 9. Five methods of knurling a piece on an automatic screw machine.**

threads and may cut oversize when tapping Class 3 fits. However, tapping a deep hole may preclude the use of the spiral tap so as to aid in the removal of chips, a condition which particularly applies to the softer alloys.

Taps should have enough land area for proper support, but the flutes also should be large enough to dispose of the chips readily. It has been recommended that taps between ½ and 1 inch in diameter have a total land area of 33 percent of the tap circumference, taps between 1 and 1¾ inches in diameter approximately a 25-percent land width, and taps over 1¾ inches an approximate land width of 20 percent. Between the total land width and the width of each land, the number of flutes may be determined. Taps under ⅜ inch generally should have two flutes.

In tapping tapered holes, the taps should have eccentric relief so that all teeth are free cutting. However, since this eccentric relief may cause the tap to shave, the threads on the tap cannot act as a lead screw and must be fed into the work, accurately following the lead of the thread. This procedure is considerably different from that employed for tapping straight holes.

Tap flutes made with an offset radius to provide approximately a 10 to 15-degree positive rake to the front of the land will produce good results on aluminum alloys. The back of the land should have a 0 to 5-degree negative rake to prevent any shaving of the threads during back-out of the tap. Larger negative angles are to be avoided, since the chips may jam between the hole and the tap. Where straight fluted taps are used to machine softer aluminum alloys, a larger rake provided by grinding a lip hook into the tap is usually required. The hook should be ground at a 10 to 15-degree angle to the axis of the tap and should include the chamfer and the first tooth. This hook must be uniform on all lips and must not break through the chamfer, or the cutting will not be uniform. A uniformly ground chamfer on all lands, usually a two-thread chamfer, is satisfactory; however, this may be decreased to a 1 or 1½-thread chamfer when tapping to a shoulder or to the bottom of the hole. A convex clearance of approximately 5 degrees will give satisfactory results.

As in threading operations, the surface speed, in fpm, is dependent upon the thread pitch. Thus, a surface speed of 200 fpm is used for tapping a thread pitch of 24 or finer, 150 fpm when the thread pitch is between 18 and 24, 125 fpm when the thread pitch is between 12 and 18; and 100 fpm when the thread pitch is between 8 and 12.

**Knurling:** This process is accomplished in various ways. Sometimes the knurl operates straight in at the side, being mounted in a round holder that takes the place of the regular circular cross-slide tool. At other times, the knurl makes its impression while passing over the top of the piece. In this case it is mounted in a holder attached to the circular cutoff tool. The knurl is located ahead and above the circular tool so that after it has finished its work on the piece and the cross slide continues to advance, the circular cutoff tools come into action.

Knurling by feeding onto the end of the piece is usually done with an adjustable knurl holder that carries a pair of straight knurls which, when set parallel to the axis of the work, produces a straight knurled surface, and when set at an angle to the axis, produces either a spiral or a diamond knurl, depending upon whether the knurls are set off at an angle in the same or opposite directions. When it is impossible to do the knurling from the cross slide and the shape of the piece does not permit running on the end, a knurling swing tool can be employed and is operated by the combined movements of the turret and the cross slides in the same manner as other swing tools. In many instances, sufficient stock support is necessary. Various methods of knurling are illustrated in *Fig.* 9.

Due to the higher surface speeds employed in machining aluminum, large diameter knurls are advisable to reduce the bearing speed of the knurls and to prevent excessive wear. Knurl pins also should be made larger to reduce the unit pressures on the bearings; in many instances, roller bearings are used to advantage. Without support, Classes 1 and 2 are limited to a knurl length equal to the smallest stock diameter. To assure equal pressure the Class 2 setup allows the knurls to move up or down slightly.

Properly equipped knurls can operate at the same stock surface speeds as other tools in the setup. Feeds vary from 0.020 inch for Class 4 feeding "on" 0.040-inch, feeding "off" 0.004 inch for Classes 1 and 5, 0.006 inch for swing types and Class 2, and 0.008 inch for Class 3. To avoid overworking the metal and producing a flaky knurl for Class 1 and 2 types, only a short dwell is employed on the work. It is of utmost importance to hold the blank diameter within close limits (plus 0.002 to 0.003 inch). While the knurl may slip slightly and still produce good knurls on the part, it cannot be expected to jump ahead.

## References


*Alcoa Aluminum in Automatic Screw Machines*, 1946, Aluminum Company of America, Pittsburgh, Pa.

*Machining Aluminum Alloys*, 1949, Reynolds Metals Co., Louisville, Ky.

*Construction and Use of Automatic Screw Machines*, 1951, Brown and Sharpe Mfg. Co., Providence, R. I.

*Brown and Sharpe Screw Machine Tools*, 1950. Brown and Sharpe Mfg. Co., Providence, R. I.

# Machinery Replacement Program

## determines cost of obsolescence*

By Robert S. Collier

Plant Manager
The Cincinnati Milling Machine Co.
Wilmington, Ohio

THESE ARE DAYS of industrial mobilization and the requirements for new equipment and machines to equip defense plants are of paramount importance. While war demands have temporarily sidetracked economic considerations in the purchase of capital goods equipment, the day will come when replacement is again judged solely on economic factors.

In normal times when no emergency is at hand American industry tends to fall into replacement lethargy, possibly due to the lack of dynamic equipment policy, and obsolete and economically replaceable equipment is allowed to remain in our plants. The selection, acquisition, use and replacement of productive equipment is not something that goes on by itself, it is the result of managerial decisions.

Fundamentally, replacement is concerned not so much with what to re-equip, but when to re-equip. The two most common methods now employed are the "pay-off period" and the "rate of return." Under the short pay-off period the equipment must pay for itself in terms of savings in direct labor in a specified period of time, usually two or three years. It should be brought out that the shorter the pay off the longer the present equipment is protected from replacement. For example, if almost any standard milling machine or grinder were bought three years ago, it would be difficult to justify its replacement with the same model just off the assembly line using the pay-off period as the basis. Its replacement, however, may be vitally necessary for other reasons, but using the short pay-off method is a fallacy.

The return on investment method is just an inverted formula of the pay-off period. For example, this method provides that a new machine must show a savings in direct labor cost for the first year equal to 25 percent on the initial investment plus depreciation, or a pay-off period of three or four years.

As an illustration, suppose the replacement of a gear shaper is being considered and, based on an estimate from a manufacturer, a return of 25 percent may be expected on the investment for a machine costing $24,000 or $6,000 a year for four years. Suppose a return of 50 percent is required on the investment or a pay-off period of two years. In effect, an umbrella is being held over the old shaper long after it should be replaced by waiting for a figure or return larger than necessary. As a result of periodic analyses of the old machine, comparing it of course with the best new one currently available, it may take years before the required replacement signal is obtained. During this time, unnecessary costs as a result of deterioration and obsolescence of the old machine have been incurred. By the same token, the target can be missed on the other side as well, causing replacement before it is necessary.

Jerome A. Raterman, president of Monarch Machine Tool Co., in a recent article stated that many concerns believe that, unless a piece of equipment will pay for itself in two or three years, it is

*Based on a paper presented at the semiannual meeting of the American Gear Manufacturers Association, October, 1952.

conservative policy to refuse to purchase. Mr. Raterman says: "That policy is not conservative. It is disastrous. That is not the road to security. It is the road to liquidation. If followed through to its logical conclusion, a company would have money in the bank and a plant ready for the scrap heap."

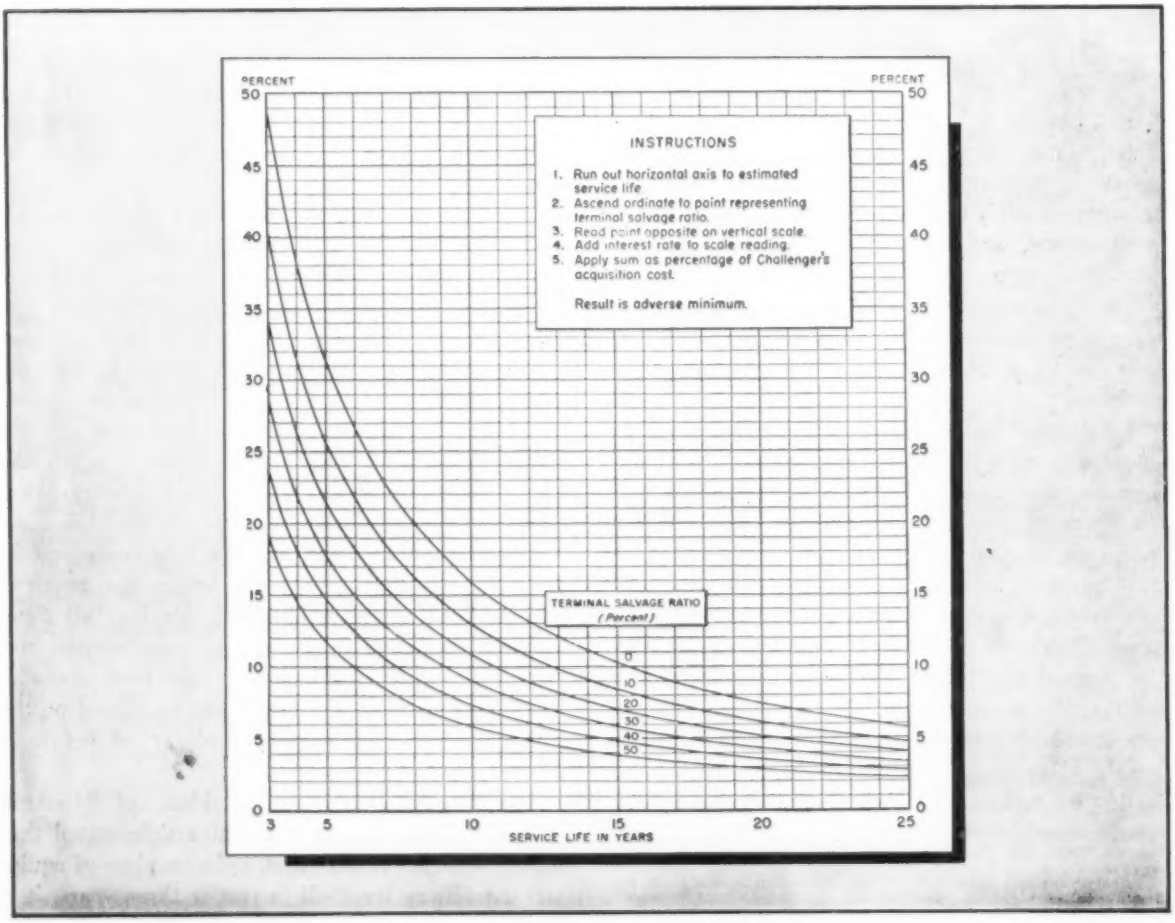
For years the machine tool and capital goods manufacturers have been attempting to solve the problem of determining the economics of replacement. Various systems and formulas were devised and, while in the right direction, the results were not completely satisfactory. The problem was presented to the Machinery and Allied Products Institute, or MAPI, an association of the principal manufacturers of capital goods equipment. As a result of rethinking the theory of replacement, MAPI published *Dynamic Equipment Policy* which has become a major influence in bringing replacement analysis techniques up to date.

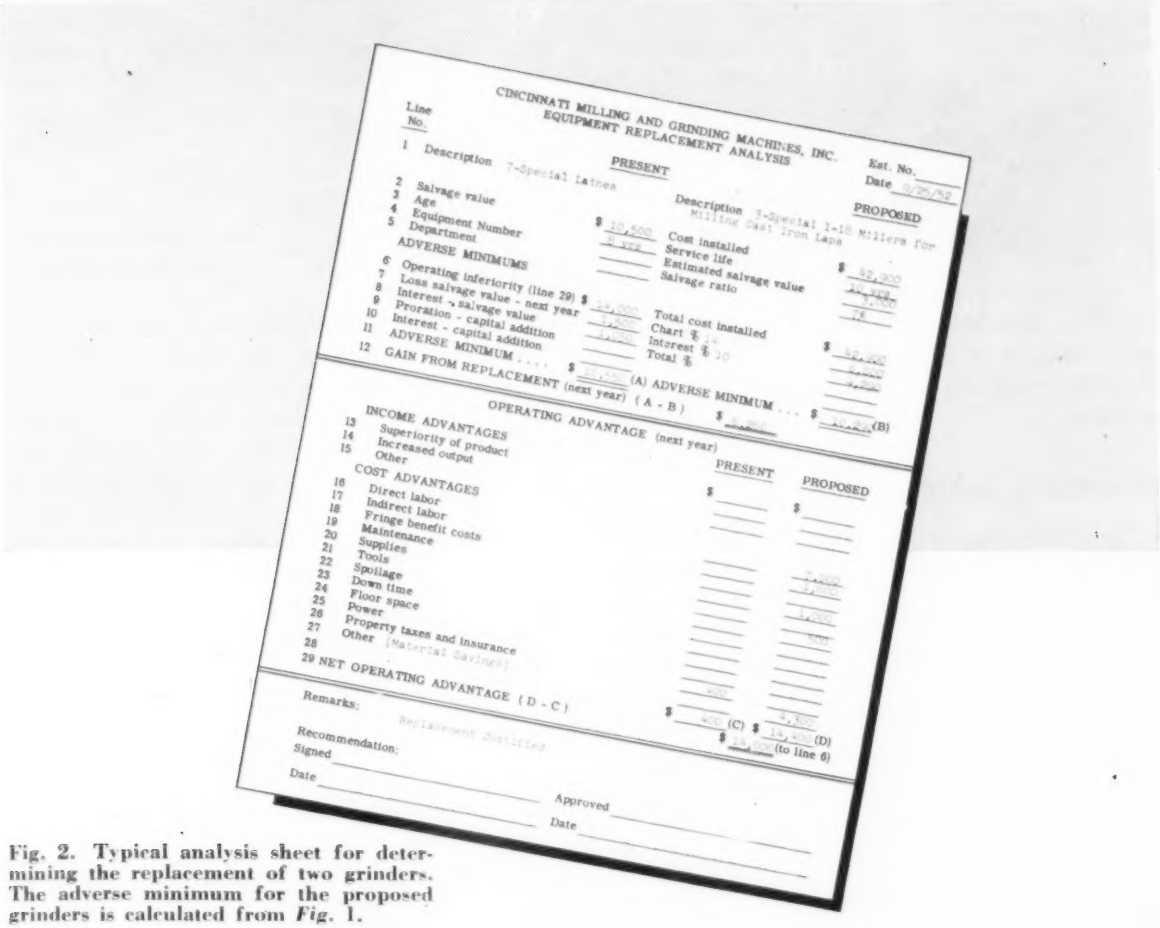
A decision to buy capital goods for replacement purposes is of necessity a long-range commitment involving the future, sometimes for many years. Obviously, a man lacks complete knowledge of future developments affecting his decision and therefore he must substitute estimates and assumptions to solve the problem. Unless he fixes the future, for the purpose of analysis, by projecting definite values for the variables involved, his problem is really insoluble. Herein is the real defect of the short pay-off or rate of return. Its assumptions as to future developments are completely hidden, and there is not the slightest idea of the pattern of future events.

The MAPI formula takes into consideration all of these factors. Instead of projecting the future operating costs of the present machines or equipment, it projects their future operating inferiorities. By this is meant the amounts by which their operating performance will fall short of the performance of the best available new equipment on the market. Thus, the object of equipment replacement becomes simply a matter of securing the lowest obtainable capital cost and operating inferiority or imperfection. By reckoning this minimum combination in terms of the lowest annual average of the two machines or pieces of equipment, the best one is the one that yields the lowest average.

To put it another way, it is necessary to choose between more capital cost and less imperfection,

**Fig. 1. Chart for deriving Challenger's adverse minimum by the MAPI formula.**





CINCINNATI MILLING AND GRINDING MACHINES, INC.
EQUIPMENT REPLACEMENT ANALYSIS

Est. No. _____ Date 3/25/52

| Line No. | | PRESENT | Description 7-Special 2-18 Millers for Milling Cast Iron Lugs | PROPOSED |
|---|---|---|---|---|
| 1 | Description 7-Special Lathes | | | |
| 2 | Salvage value | $ 10,500 | Cost installed | $ 49,000 |
| 3 | Age | 6 yrs. | Service life | 10 yrs. |
| 4 | Equipment Number | | Estimated salvage value | $ 4,900 |
| 5 | Department | | Salvage ratio | 10% |
| | ADVERSE MINIMUMS | | | |
| 6 | Operating inferiority (line 29) | $ 14,000 | Total cost installed | $ 49,000 |
| 7 | Loss salvage value - next year | 1,400 | Chart % 10 | 4,900 |
| 8 | Interest - salvage value | 420 | Interest % 6 | 2,940 |
| 9 | Proration - capital addition | 1,400 | Total % 16 | 7,840 |
| 10 | Interest - capital addition | 420 | | |
| 11 | ADVERSE MINIMUM | $ 16,240 | | $ 49,000 |
| 12 | GAIN FROM REPLACEMENT (next year) (A - B) | $ 6,240 | (A) ADVERSE MINIMUM | $ 10,840 (B) |

OPERATING ADVANTAGE (next year)

| | | PRESENT | PROPOSED |
|---|---|---|---|
| | INCOME ADVANTAGES | | |
| 13 | Superiority of product | | |
| 14 | Increased output | | |
| 15 | Other | | |
| | COST ADVANTAGES | | |
| 16 | Direct labor | $ | $ |
| 17 | Indirect labor | | |
| 18 | Fringe benefit costs | | |
| 19 | Maintenance | | 2,000 |
| 20 | Supplies | | 1,000 |
| 21 | Tools | | 3,000 |
| 22 | Spoilage | | 400 |
| 23 | Down time | | |
| 24 | Floor space | | |
| 25 | Power | | |
| 26 | Property taxes and insurance | | |
| 27 | Other (Material Savings) | 400 | 4,000 |
| 28 | | | |
| 29 | NET OPERATING ADVANTAGE (D - C) | $ 400 (C) | $ 14,400 (D) |
| | | | $ 14,400 (to line 6) |

Remarks: Replacement Justified

Recommendation:

Signed _____ Approved _____

Date _____ Date _____

**Fig. 2. Typical analysis sheet for determining the replacement of two grinders. The adverse minimum for the proposed grinders is calculated from *Fig.* 1.**

or less capital cost and more imperfection. With these two choices the job is to find the proposition in which the sum of these factors is the lowest. Since they are all adverse factors or factors that will cost money, the best one is the one that yields the minimum in costs or the adverse minimum.

Operating inferiority is defined in general as the margin by which the performance of a machine in service falls short of the performance obtainable from its best current alternative, and in replacement analysis this operation gap is measured on the next year's operation only. For the machine in service, the next year's sum of the operating, inferiority and capital cost is the point at which these factors are at their lowest. Each year thereafter the imperfections and inferiorities will increase.

In figuring the next year's operating inferiority of the present equipment, the procedure is somewhat similar but not identical to the usual reckoning of annual cost saving because under the formula the comparison of the two facilities is not limited to cost differences alone. Included in the analysis are the direct labor saving resulting from increased speeds and feeds, automatic features, setup time, multiple machine operations, etc. There may be savings in supervisory and administrative costs as well as reductions in direct and preventive maintenance costs. Savings in tooling costs may result and consideration should be given to reductions in subsequent operations and, of course, spoilage. All factors that could enter into the inferiority of existing equipment should be evaluated. There may be difficulty in obtaining some of this information, but a reasonable evaluation of the cost factors involved may be based on experience.

To this operating inferiority figure must be added its capital cost, if any, the interest on the present salvage value of the present machine, and the prospective loss of salvage value during the next year. The reason for this is that, by not selling or disposing of the old equipment, the money is not available that could be put to use earning at the same rate that other money in the business is earning. The yearly loss in salvage value and the interest on the present day salvage value of the equipment, together with any capital cost, plus the operational inferiority, is the lowest point in the cost scale of the present machine, or its adverse minimum.

While it is permissible to compute the present

machine's adverse minimum from estimates for next year only, the calculation of the proposed machine or new equipment must run into the future. Therefore, its operating inferiority is estimated for years ahead. While the new equipment at present has no inferiority, it will, if installed, acquire inferiority in the future as it deteriorates in service and as new machines are available. Obviously, it is impossible to forsee the year-by-year development of operating imperfections in the new machines. Therefore, its inferiority is calculated at a constant yearly rate and, in doing so, the future development of its operating imperfections is fixed in a single estimate.

### Determining Cost of New Machine

To compute the adverse minimum or the lowest point in the cost scale of the proposed equipment, the prospective service life is estimated for the proposed equipment or machine. Its service life is the period during which this new machine can successfully demonstrate its superiority over another machine of advanced design.

The proposed machine will tie up for a considerable period of time a certain sum of money, which, if invested or used as operating capital, would yield interest or income to the company. Probably a rate of 10 percent would be acceptable, but, in any event, a rate should be selected close to the rate that the company will earn as a result of the installation of the new equipment. It may be that the interest rate will be dependent on the source of the replacement funds such as borrowed money or equity money.

If the proposed machine is expected to have salvage value at the end of its service life, this should be estimated. It is true that estimates will be based on salvage values at present. These values won't be far out of line ten years hence, barring a war, and the resulting surplus equipment.

After this information has been assembled, including the installed cost of the proposed equipment, its adverse minimum or its lowest point in the cost scale can be estimated. With the interest rate applied to the purchase price of the proposed equipment, the cost for one year is determined for tying up a sum of money in a capital asset.

In addition, each year a sum is set aside to replace this equipment at the end of its service life or when a new piece of equipment arrives on the scene. At this time some salvage or terminal value may be left in the machine. Simply by taking the number of years of service life and dividing it into the cost of the equipment is not sufficient. This method does not take into consideration the geometrical decline of values as the machine becomes older nor the cost each year of providing for the ultimate replacement of the equipment projected over a period of years. This is done by a formula providing for "present-worthing" future values. MAPI has simplified this process and reduced it to the graphic illustration shown in *Fig.* 1.

The difference between the adverse minimum of the present equipment and the proposed equipment will signify replacement, or that replacement is premature, *Fig.* 2.

Furthermore, the formula shows the cost of not replacing the equipment. The MAPI formula gives in dollars and cents the penalty for inactivity and apathy in replacement. Every day that replacement is deferred is costing money and the formula measures this cost. There may be a savings resulting from the replacement of the existing equipment. At the same time there is a cost for deferring the purchase of this equipment which continues as long as replacement is postponed.

There are two principal requirements of a sound equipment policy:

1. A reliable technique for determining when equipment is economically replaceable and at the same time some measure of the cost of deferring replacement.
2. An organizational setup to apprise management of re-equipment opportunities.

The MAPI formula fulfills the requirements of a good equipment policy and has the following advantages: It

1. Takes future deterioration and obsolescence into consideration.
2. Takes cognizance of revenue differences as well as cost differences.
3. Provides a usable measure of the cost of not replacing equipment.
4. Provides an instrument for budgeting of equipment purchases.
5. Is applicable to a single unit or machine or a combination of replacement and expansion.
6. Simplifies calculations because of the short cuts which have been developed.

The MAPI formula is about three years old. It is difficult for formulas and theories of this sort to take hold and grow. However, it has made more progress than any other formula of this sort. Companies have adopted it as the basis for buying programs. Many concerns in the machine tool and capital goods industries are using it in their sales efforts. Others have adopted it with certain modifications. Many at present are investigating it.

The matter of re-equipment, and the methods and processes of manufacture in this country are still in the hands of management. The consequences of bad mechanization are self-evident. The industrial strength of this nation is based upon the early replacement of its obsolete facilities.

Tool Engineering Report No. 12

# Safety First for Presses

By Robert T. Kimmel

PRESSES ARE USED more widely in the metalworking field than almost any other type of machine and are also about the most dangerous for the operator. This record of accidents on presses has resulted in extensive research on the part of equipment manufacturers as well as users to find methods which will remove this element of danger from press operation. Modern presses, almost without exception, incorporate built-in safety devices designed as standard equipment or to customer specifications.

In this field, the designer almost needs a lawyer as an aide since there are state and municipal regulations in some sections of the country in addition to the codes established by the American Standards Association, the Joint Industry Conference, and the recommendations of the National Safety Council. Insurance companies have their own standards and regulations. The United States Department of Labor also has prepared a number of publications on suggested safeguards.

While the newer types of presses incorporate safety devices, the majority of presses in operation in shops throughout the country do not have these safeguards and, with the present machine tool replacement problem, the condition is likely to continue for some time. Progressive management recognizes this problem and company policies have been established to take advantage of every possible means of providing safe operating conditions for the press operator. This is not an altruistic attitude by any means. It is the most economical one.

Most of the agencies mentioned agree that safety for press operations begins with plant layout. Aisles near presses should be wide enough for free movement without danger of accidentally tripping any of the controls, and this movement should be restricted to traffic directly connected with the press operations only, *Fig.* 1. Provision must be made for storage of material in process and completed parts in order to eliminate dangerous obstacles for

**Fig. 1. Keeping the work space clean and free of obstructions is one of the first precepts for safety. Wide aisles permit easy access for trucks to the press area.**

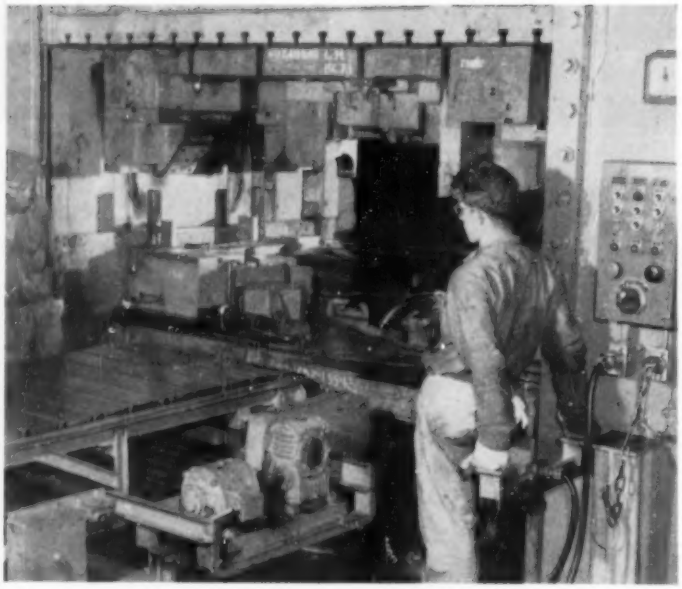


**Fig. 2. The die block behind the operator is chained to a plug in the control circuit so that the press cannot be operated if the block has been left in the die opening.**

the operator. Stacks or piles of material or parts may cause an operator to stumble or trip and thus come into contact with moving parts of the press, resulting in injury.

Lighting is another item to be considered when laying out a press installation. There should be a high over-all level of illumination in the area and, in addition, auxiliary lighting can be installed on the machines as needed. Glare from polished surfaces should be avoided. A major factor in the lighting plan is the paint on the walls and the machines themselves. There are differences of opinion as to what color combinations are best, but considerable study has been given to the problem, and the results of these researches are available from qualified consultants and paint manufacturers.

Also to be considered is the installation of the presses. Because of the repeated impacts, it is imperative that the mounting of the equipment be made as vibrationless as possible. Continued operation of a machine which is improperly installed will probably result in the failure of some part which might cause a serious accident to the operator.

## Machines and Maintenance

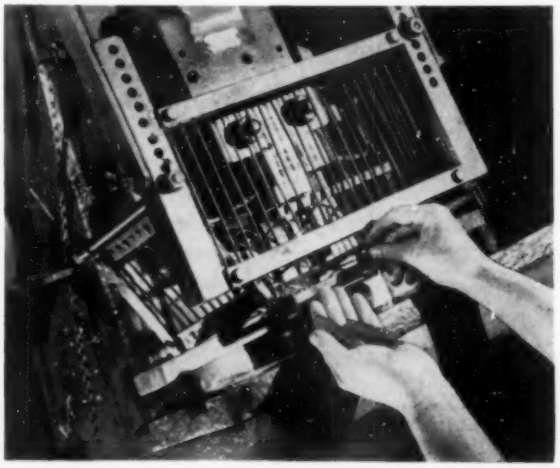
An important part of tooling for a press operation is to provide the correct accessories and to install them so that proper operation is assured. They should be as nearly operator-proof as possible so that any tendency to violate safe operating practices are nullified from the start. Most of these accessories are for feeding and guarding the press and will be discussed later.

Maintenance of the equipment is of utmost importance and demands a regular scheduled inspection and repair program carried out by men who are trained for the job. A recent analysis by the statistical committee of the power press and forging section executive committee of the National Safety Council of 590 power-press accidents involving some degree of permanent injury showed that 99 resulted from press deficiencies. Of this number, 41 were caused by defective clutches. The analysis showed that 86 injuries resulted from defective guards or tripping devices. This is indicative that, no matter how elaborate the safeguards, there is really no safety provided for the operator unless the equipment is maintained.

Conditions in each shop will determine the frequency of inspections since amount and type of duty for each press will vary considerably. On this schedule should be an examination of the press frame for cracks and broken pieces. Brackets should be inspected for loose nuts and bolts. Tie rods should be checked for fractures or stretching. Tie rod nuts on top of the press may fall if failure occurs and should therefore be secured to the press. A steel strap under each bottom tie rod nut will prevent the rod from dropping if it fails. Another method is to weld the nut to the press.

Other items to be checked include bearings, lubrication points, the drive and power source, ram and slide, press guards, and clutches and brakes. The last three items are important. Defective guard devices are doubly dangerous in that the operator is given a false sense of security. The operator also

**Fig. 3. Suitable guards should be provided for each die by the designer.**



depends heavily on the clutch and brake in case of an emergency so that it is imperative that they both be in working order.

A die block or safety bar should be provided for use when any work is to be done on the press. This is to prevent cycling of the press when a die setter, a maintenance man or the operator has a part of his body in the opening between the ram and the bolster plate. At the lower right in *Fig.* 2 can be seen a die block which is chained to a plug in the control circuit. Thus, while the die block is in the die opening, the press cannot be operated. This press is used for a trimming and piercing operation on a rocker panel in an automotive plant. The conveyor in the foreground brings the piece from the first drawing operation for hand feeding in this press. Both operators must use both hands to depress the RUN buttons to operate the press.

## Die Design

A prime factor in safe press operation is good die design. If safety features have not been incorporated in the die through design, improvisations will be necessary later, resulting in higher costs and incipient accidents and injuries. It is part of management's responsibility to recognize this situation and to issue, as a matter of policy, instructions to the designer such as the following:

(1) Before starting to design a die, determine what method of feeding is to be used to insure safe operation.

(2) Cut away all unnecessary metal, especially on the front and sides.

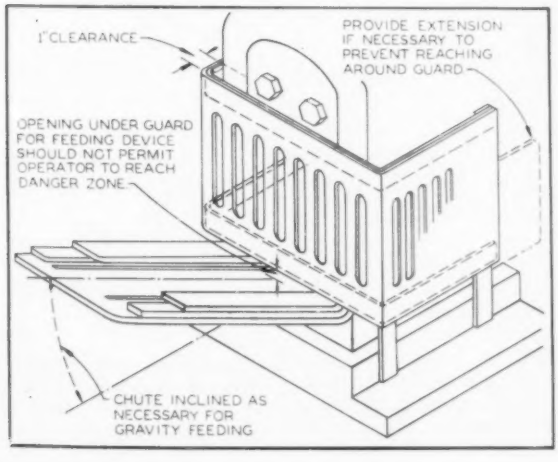
(3) Cut away the front of the upper die at a 45-degree bevel to decrease the danger zone and enable the operator to see the work.

(4) Construct and set the dies so that the operator will hold the stock by the sides, not the top and bottom.

(5) If a piece is to be cut or formed on one end only, arrange the dies so that the other end of the piece will project at the front and can thus be held safely by the operator.

(6) Tap heavy dies so that screw eyes may be inserted for convenience in lifting. On exceptionally heavy

**Fig. 4. Individual die guard with an inclined chute for gravity feed.**



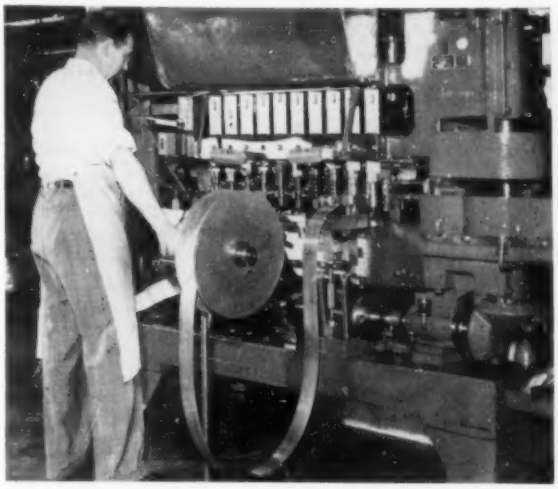
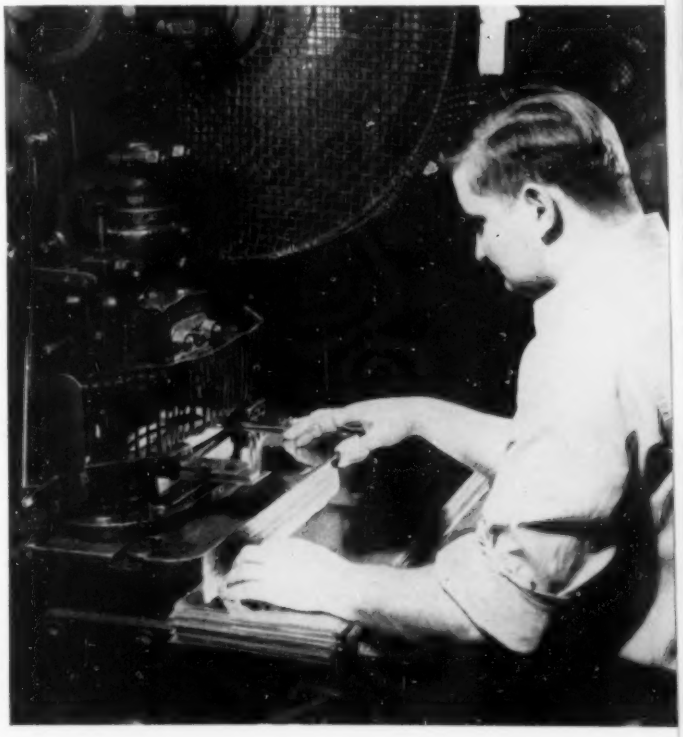



**Fig. 5. Coil feeding of strip stock removes the necessity for the operator to place his hands into the danger zone when the press is operating.**

**Fig. 6. A simple chute feed with attached die guard is adaptable to many operations using manual feed.**



dies, steel lifting pins should be cast into the die. In case of dies with pilot pins, the screw eyes or lifting pins should be placed in the lower die to prevent dies from separating.

(7) A soft punch and hard die tend to prevent chipping. Use this combination for materials such as tin, paper, etc.

(8) Use guide pins to insure alignment of dies and reduce hazard of flying particles. These guide pins should be either nonseparating or enclosed in telescoping springs.

(9) Make an enclosing guard to fit the die or adjust some guard already on hand for this purpose when hand-fed blanking work is involved, *Fig.* 3. On some small jobs the enclosure may be attached to the die or die block instead of to the machine. Generally, the bottom of the enclosure can be attached to the stripper.

(10) Set the stripper or enclosure not more than ⅜ inch above the lower die and have the top of the enclosure at least as high as the highest travel of the ram.

(11) Guard not only the front but both sides of the die, and the back, if possible, so that the operator will not be tempted to reach around under the ram if the material sticks, *Fig.* 4.

(12) Extend the lower die sideways and backwards by means of a plate if necessary to prevent the operator from reaching into the die opening.

## Operating Personnel and Practices

Safe operation of an unguarded press requires a higher standard of mental and muscular coordination than most persons possess. If this fact were generally recognized, point of operation guarding would be more universally employed and less reliance would be placed on the infallibility of operators. On the average, punch-press operators have no special aptitudes in machine operation, and it is, therefore, neither logical nor reasonable to expect them to be above making occasional errors.

In many shops, emphasis is placed upon the selection and training of press operators. This is a necessary procedure, but too often the training begins and ends with a mere recital of the things the operator should not do. Here, selection and training are but two items in the general scheme of preventing accidents on an extremely dangerous machine. The most important single item is guarding the point of operation in such a manner that it is impossible for an operator to place his hands or fingers in the die opening. It is also important that each press operator be instructed in the safe methods of doing the work and informed of the hazards involved before being assigned to a press having a setup on which the operator has not been previously instructed.

According to the National Safety Council, the vast majority of point of operation power-press accidents occur during the normal operation of unguarded or imperfectly guarded presses. Each accident represents an error in human judgment, and such accidents have been found by the Council to be due to or to occur under one of the following curcumstances:

(1) Improper method of die setting.

(2) Premature tripping (due to operator riding the treadle, operator being bumped by a passing person or truck, or falling objects striking the treadle).

(3) Tripping the press before removing fingers from the danger zone, or attempting to adjust material in the die after, or at, the instant of tripping.

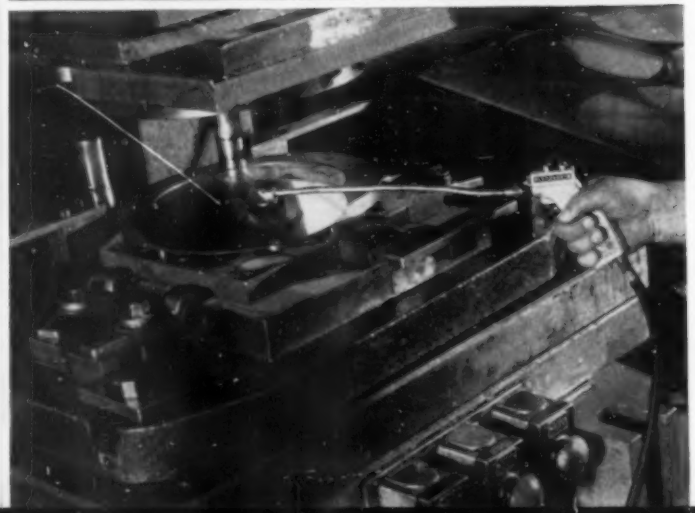


**Fig. 7. (above) Die guard is raised to show the automatic remover used with this slide feed.**

**Fig. 8. (below) When the nature of the operation prevents the use of some feeding device, manual loading is much safer by the use of hand tools such as the suction cup.**

(4) Wearing gloves on certain types of operations.

(5) Making guards inoperative or otherwise not using the protective devices provided.

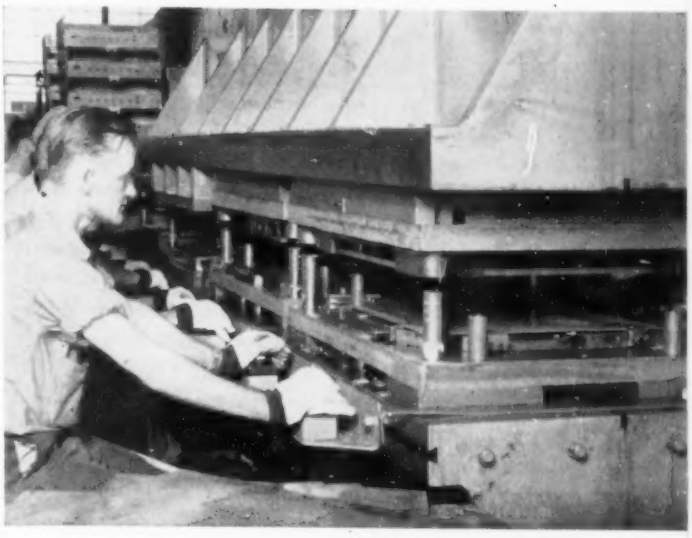
### Feeding Methods

When an automatic feeding mechanism is employed, the operator is not required to put his hands into the danger zone and his attention is not required at each stroke of the press. Semiautomatic feeds are similar except that the operator must operate some mechanical device at each stroke of the press to feed the material into the die. Manual feeds require the operator to place the piece into the press with his hands or with a hand tool.

**Automatic Feeds:** Three types are usually employed with presses, the most widely used being the roll feed. The strip stock is coiled on a feed roll, *Fig.* 5, usually motor-driven, and is particularly suited for continuous operations. Many different types of coil holders, cradles, drives, etc. are available to meet individual requirements. To be most effective, they should be included in the original design of the installation. Though the operator is not required to place his hands into the danger zone during feeding, there will be times when a finished piece or a bit of scrap sticks in the die and must be removed. To prevent the operator from doing this manually, the ram must be guarded and a stick of wood or a soft metal pick used for removing the piece. Picks of these materials will not damage the die if the ram descends unexpectedly.

Automatic push or pull feeds are similar to roll feeds and are used mostly for blanking large pieces. Automatic plunger feeds are magazines or chutes in which blanks or partly formed pieces are placed and fed one at a time by a mechanical plunger which pushes them into place under the ram. Sometimes this method of feeding cannot be used where accurate placing is required.

**Semiautomatic Feeds:** The five major types of semiautomatic feeds include chutes, slides, dials, and revolving or sliding dies. When one or more of these mechanical devices are combined so that the operator does not need to give his attention to



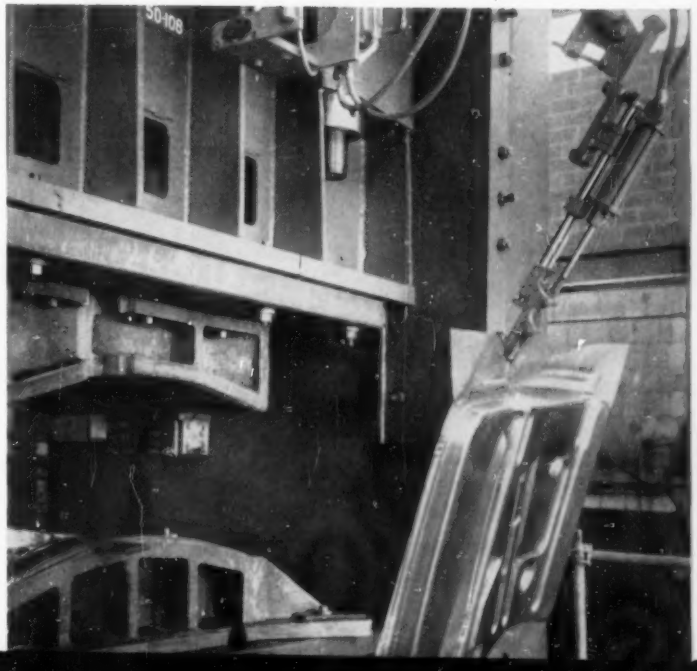


**Fig. 9. (Top) The workpiece is passed from hand to hand by these three operators working at a press brake.**

**Fig. 10. (Center) Two palm buttons are provided for each man and the press will not operate unless they are all depressed simultaneously.**

**Fig. 11. (below) Automatic unloading keeps the man behind the press out of the danger zone.**

**Fig. 12. Harness type safety guards are used with presses having a positive type clutch. These guards require frequent precise adjustments.**

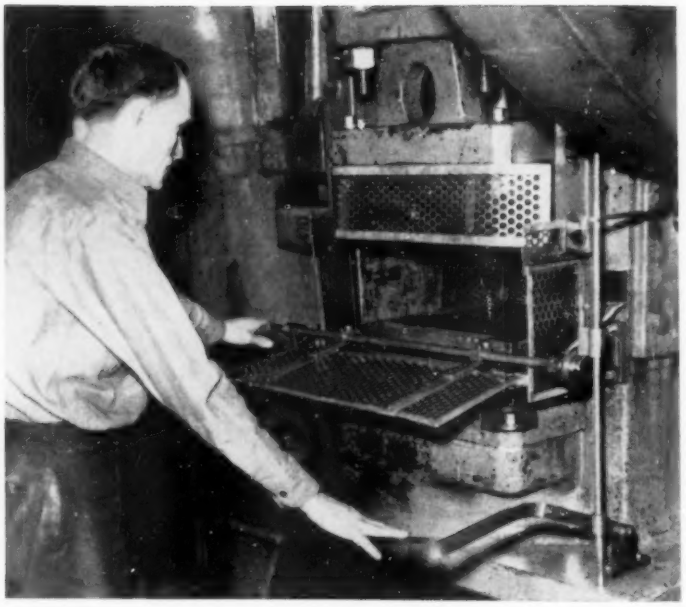


**Fig. 13. The enclosure on this power press is interlocked with a two-hand tripping device to prevent operation.**

each stroke of the press, they become automatic feeds. Principal example of this is a dial feed with a hopper attachment.

Chute feeds, *Fig.* 6, can be adapted to many operations which are now handled by manual feeding. Inclining the press helps in this case to position the piece more accurately and also aids in removing the finished item.

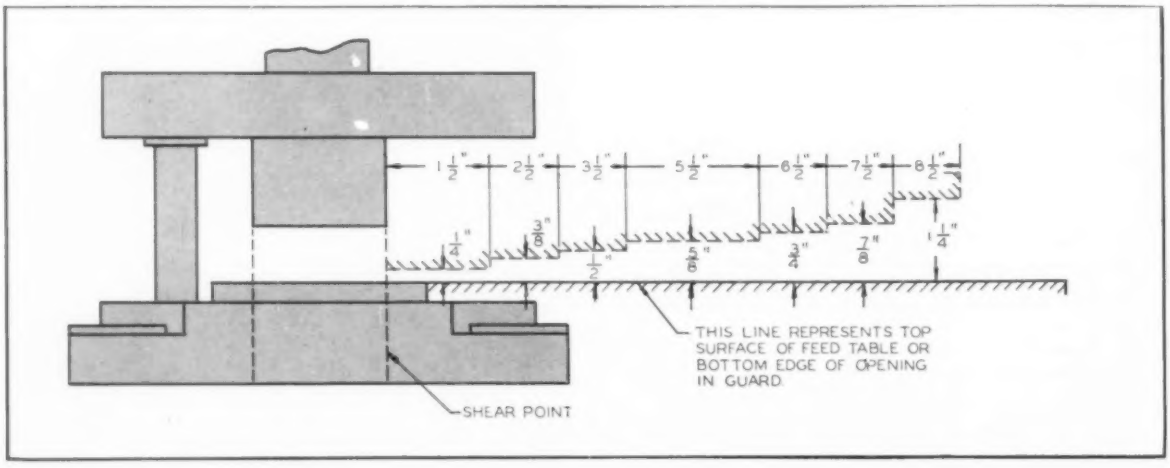
Sliding feeds are combined magazines and plungers, *Fig.* 7. The magazine is filled with stacked pieces, and as each one reaches the bottom, it is pushed forward into the die with a hand-operated plunger.

Sliding dies are moved forward to the operator for loading and then returned to position under the ram. The die and the press should be interlocked so that the press cannot be tripped unless the die is properly positioned.

Dial feeds and revolving dies operate on the same principle. Revolving dies consist of two or more dies arranged so that while one is in position under the ram, the other is available for safe loading by the operator. The dial feed carries the piece to a fixed die.

**Manual Feeds:** Some operations require manual feeding, and in these cases the maximum amount of protection must be provided. Special hand tools

**Fig. 14. Recommended opening dimensions for punch press guards.**



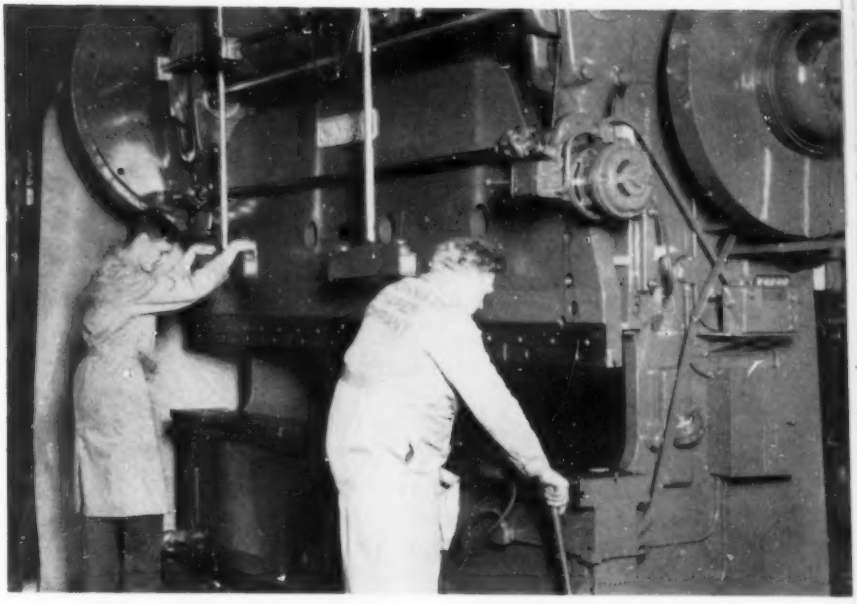


**Fig. 13. The manual clutch on this press cannot be operated until the assistant operator has indicated his readiness by depressing the two buttons at his station.**

permit the operator to place the stock in the die without putting his hands into the danger zone. These include magnetic and pneumatic devices as well as tongs, *Fig.* 8. In some cases more than one operator is required for an operation such as is shown in *Figs.* 9 and 10, where the work is transferred by hand from one station to another. Nearly 300 holes are put into this blank for a television chassis and, in the final steps, the blank is formed and bent. This press has an air-operated electrically controlled clutch so that the descent of the ram is stopped if any of the controls are not operative. Each of three operators is provided with two palm buttons, all of which must be depressed simultaneously to operate the press.

Another device, *Fig.* 11, providing greater safety in unloading operations is the Iron Hand which removes the finished piece from the press. Here it is unloading an automatic inner door panel which is produced at the rate of 12 per minute. An automatic feed is also incorporated in this installation.

### Guarding Methods

Preventing the operator from putting any part of his body into the danger zone in the die opening is the essence of accident prevention in press operation. This can be accomplished in two ways, depending on the type of press, or rather the type of clutch used on the press. Friction clutches permit stopping the machine anywhere in its cycle. When the press is equipped with a positive or jaw clutch, however, the full cycle will be completed once the controls have been tripped.

With the friction type of clutch, it is usually sufficient to provide two-hand controls which effectively remove the hands of the operator from the die opening during operation. When the positive type of clutch is employed, the die openings must be protected with guards or barriers. Another device is a harness which forcibly removes the operator's hands from the die opening if the ram begins to descend, *Fig.* 12. The harness does not interfere with normal movements. Its use, however, must be closely supervised to be certain that it is properly adjusted each time the press setup or the operator is changed. In addition, maintenance is usually high because of the construction and the necessity for precise interlocking with the press slide or ram.

Another mechanical device for removing the operator's hands from the die opening when the operating cycle is started is a sweep which again uses force. The part that comes in contact with the hands or arms must be padded with a soft material to prevent bruises, and care must be taken that the hands are not caught in a shear action between the sweep and some part of the press. These last two devices are employed where manual feeding of the press is used.

Individual die guards should be an integral part of the die and attached to it so that the die is completely enclosed. The guards must permit easy feeding, and good visibility is a necessity at all times. Various types of plastics can be used to provide visibility, but attention must be given to their flammable and shattering qualities. Slotted material is preferable to a grid since studies have shown that operator eye fatigue is thus reduced.

When individual die guards are precluded for

reasons of cost, time or length of production run, an adjustable press barrier may provide the necessary safeguard. These can be of two types and are not difficult to fabricate or they can be bought commercially. The first type of barrier guard can be used where dies may vary in size but can be completely covered during the operation. The second type is suitable when periodic access to the die is necessary to remove scrap or jammed pieces which cannot be removed by a hand tool. This type has a pivoted front or side panel, *Fig.* 13, so interlocked that the press cannot operate when the panel is open.

The safe opening dimensions for punch press guards are shown in *Fig.* 14. In no case should it be possible for the operator to insert his hands far enough for his fingers to enter the point of operation zone. The dimensions shown are such that this condition is impossible even though the guard contact is on the back of the fingers, hand or forearm.

Press brakes are still operated in many cases with a manual clutch. This means that the clutch is engaged by foot or hand power, or both. The manual clutch has a safety lock which, when used, prevents operation of the press until the lock is released. This is standard equipment and consists of a pin that is pushed into place to prevent operation of the machine. To operate the machine, the pin must be pulled out.

The press brake in *Fig.* 15 is a late-model machine with a manually operated clutch and an electrically operated latch for the protection of assistant operators. The box on the front of the bed near the floor and immediately over the treadle shaft contains a solenoid which pulls a lock out of engagement when the solenoid is energized. This occurs when all of the hand buttons are depressed. The circuit is then completed and the treadle is free. Any number of buttons can be provided to accommodate all of the required operators.

In the operation shown, two men are needed. The one at the right operates the clutch while the operator at the left presses down the two hand buttons when he is ready. The solenoid then unlocks the treadle and the operator at the right can engage the clutch to turn over the machine. His left hand must be on the button provided. The second station which is not occupied has been locked out; that is, the buttons are locked in position to complete the circuit.

Press brakes are equipped with control panels through which control circuits may be connected to meet each job's requirements. Arrangement of the controls is part of the machine setup routine and only authorized personnel should be permitted to make changes. In *Fig.* 16 the keys can be seen in each station for locking the buttons in the proper position when all of the stations are not in use. The stations at the back of the machine are also visible through the press opening.

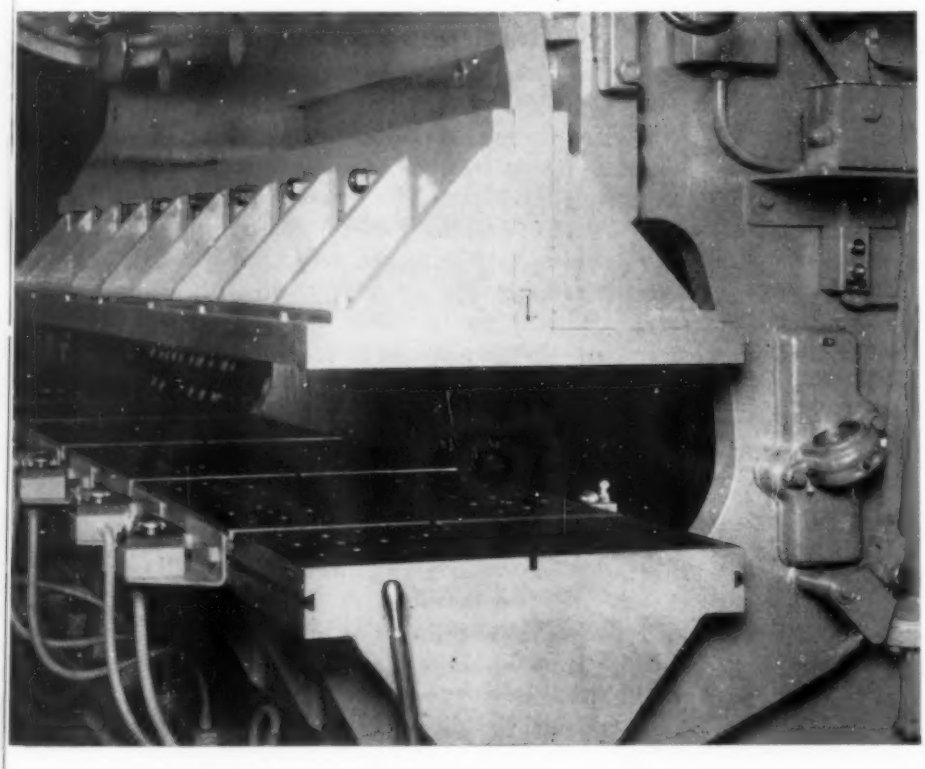


**Fig. 16. After the press setup has been completed, the correct control circuits are established and locked in so that unauthorized personnel cannot make changes.**

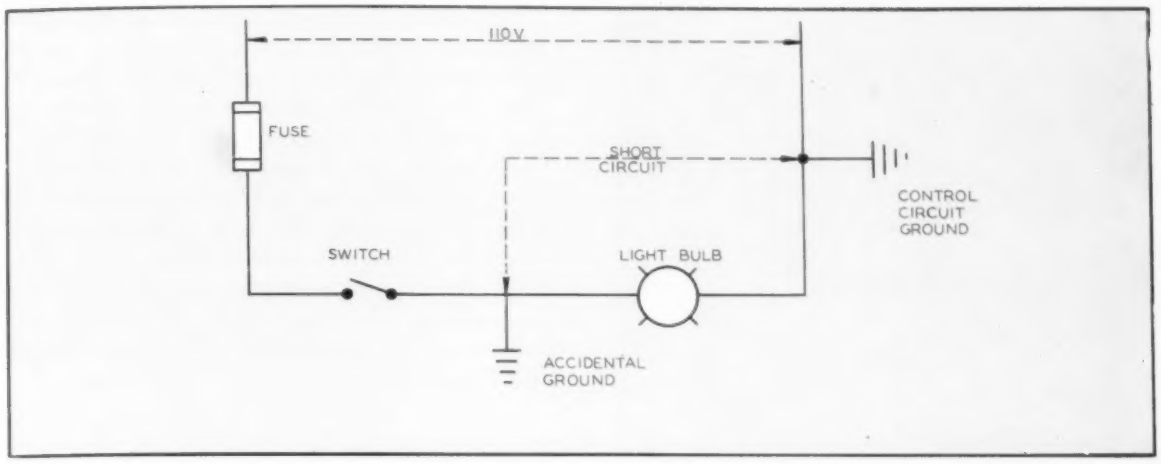



**Fig. 17. The control circuits shown in *Fig.* 18 employ the principle shown in this schematic diagram to stop the press when a ground occurs.**

Two types of operation can be set up on the machines shown in *Figs.* 15 and 16. The first is an inch or long operation. This means that the press will run only as long as the buttons are depressed. This is continuous throughout the cycle. If any one button is released, the press stops, whether it is on the up or down stroke.

The second type of operation is called a run operation by this particular manufacturer, but is known by several other names in various parts of the country. In this combination, the ram will move on the down stroke only as long as the buttons are depressed. If anyone removes a hand, the ram will stop during the down stroke. At or near the bottom of the down stroke, all danger is past and to speed up operation, an automatic return to the top is executed by a cam-operated limit switch and the proper control circuit. This permits the operators to transfer their workpieces to the next station and gives the first operator a chance to turn around and reach for another blank. The machine always stops at the top automatically under any conditions. All hands must be taken off the buttons to reset for another press operation.

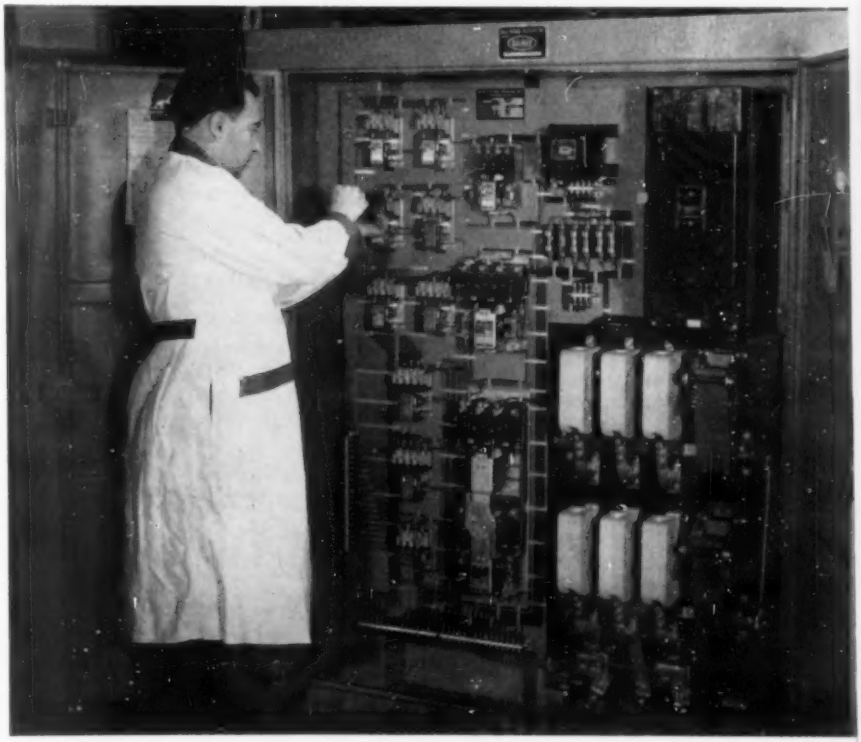


**Fig. 18. Modern presses utilize built-in electrical controls for safety devices. Any defect will immediately stop the press.**

**Fig. 19. Controls on this press are grouped on a panel recessed in the press upright. They are safer from accidental tripping or damage.**

The control cabinet for a press which features a built-in safety circuit is shown in *Fig.* 17. The cabinet itself has an automatic disconnect switch which trips the circuit breaker when the doors are opened. A single wire grounded control system protects the operator against any accidental grounds operating any of the press control systems. Any ground occurring on the hot side of the line will assume the characteristics of a short circuit and blow the fuse, thus stopping the press. A schematic diagram of the circuit, *Fig.* 18, illustrates how this system works.

The control panel on this press, *Fig.* 19, is recessed into the press upright. The setup man selects the correct cycles for the operations to be performed and then locks the controls to prevent unauthorized changes. The inch button shown incorporates a feature which prevents the operator from blocking in the inch button so that he can control the press with the stop button. In addition, this control system is designed to protect the press and die from damage.

Photoelectric units are sometimes used to guard large slow-speed presses which have long strokes and friction clutch drives and brakes. The device should be placed on the press so that a curtain of light is provided across the open side which gives access to the point of operation. It should be connected so that the ram is brought to a stop if the beam is interrupted. This type of guard is highly dangerous when applied to a press with positive clutch since there is nothing to prevent the operator from putting his hand into the die opening and, once the press is tripped, it will complete its cycle before stopping.

## Guard Construction

The following general recommendations apply to both built-in electrical controls and mechanical devices and fixtures which are attached to the press.

(1) Every device should be simple and reliable in construction, and should be easy to apply and adjust. Mechanical devices should be permanently attached by means of cap screws or through bolts to the press frame. The device in itself should not offer any accident hazard. It should be designed and constructed to minimize the possibility of removing or misusing essential parts and to facilitate inspection of them.

(2) The device or control should be designed so that it would be extremely difficult, if not impossible, for the operator to place his hand, or permit it to remain, in the danger zone while the ram is approaching the bottom of its stroke.

(3) On slow-acting presses, the device should be arranged so that the operator cannot place his hand in the danger zone after the press has been tripped and while the ram is still descending.

(4) Openings in guards should not be greater than those shown in *Fig.* 14.

(5) Unless the device is directly connected to the ram to prevent recycling, a nonrepeat attachment should be provided.

## References

*Power Presses, Section 7, Accident Prevention Manual for Industrial Operations.* National Safety Council

*Inspection and Maintenance of Power Presses,* National Safety Council

*Power Presses,* National Safety Council

*Individual Die Guards and Adjustable Press Barriers,* National Safety Council

*Power Presses and Foot and Hand Presses,* B.11.1-1948, American Standards Association

## Photographic Credits

Cincinnati Shaper Co. ..... Figs. 9, 10, 15 and 16
Clearing Machine Corp. ..... Fig. 11
Danly Machine Specialties, Inc. Figs. 1, 2, 8, 17, 18 and 19
Detroit Stamping Co. ..... Cover
National Safety Council .... Figs. 3, 4, 6, 7, 12, 13 and 14
John Volkert Metal Stamping, Inc. ..... Fig. 5

# ASTE NEWS

## ...featured this month



Above: Student activities were discussed recently by the Waterloo executive committee, President Bellamy (seated, far right) and National Editorial Chairman Wayne Kay (who doubled as chief photographer). Others shown, seated, are: O. L. Turner, J. F. Meldrum, William Bone, D. L. Peterson. Standing: A. F. Parker, Prof. L. V. Colwell, Chairman D. D. Lowber, Bert Fleming and Hector Haas.

Above: Shown after their luncheon break at the last meeting of the ASTE national officers are: Treasurer H. C. McMillen, Third Vice President H. B. Osborn, Second Vice President J. P. Crosby, First Vice President R. F. Waindle, President L. B. Bellamy, Executive Secretary H. E. Conrad, Assistant Secretary G. A. Rogers, Secretary H. E. Collins and Assistant Executive Secretary A. R. Putnam. Right: President Bellamy is shown with the German machine tool experts and their interpretors who toured ASTE headquarters on a visit to Detroit under the sponsorship of the Mutual Security Agency.

# Dedication to Highlight Leadership Conference

*By Nancy L. Morgan*

The tool engineering capital of the world will be located in Detroit, Mich., on March 16 and 17 when all of ASTE's national officers, directors, committee chairmen and the 1953 chapter chairmen join forces for the Society's first Leadership Conference. Long a dream of ASTE pioneers, the two-day meeting is designed to bring first-hand knowledge on successful chapter operation to the men who will guide activities in ASTE's 102 chapters during the next year.

Dedication of the Society's national headquarters office building will highlight the conference, which precedes the opening of the 21st Annual Meeting. Participating in the ceremonies will be city and state government representatives, civic leaders, officials of other societies and, most important of all, those ASTE members who were instrumental in making the national headquarters building a reality.

Marking another milestone in technical society progress, the Leadership Conference establishes another 'first' for ASTE. No other organization of its type has sponsored such a meeting.

Invitations are being extended to each newly-elected chapter chairman to participate in this outstanding meeting as guests of the Society. A complete and extensive program, planned specifically with the chapter in mind, will offer a vital fund of ideas.

Unparalleled opportunity to talk over chapter problems with other chairmen and national ASTE officials will be provided at a number of round table meetings, panel discussions and "bull sessions." Two plays will be staged to show dramatically the ways chapter meetings can be conducted. Luncheons, receptions, social hours and a banquet will give a change of pace to the well-balanced program.


## Headquarters Tour

Visitors will be taken on conducted tours of the ASTE headquarters to study the many phases of Society operation. The particular responsibilities of every staff member will be reviewed, the expanding facilities of ASTE will be discussed and the relationship of chapter activities to those at national headquarters will be explained. The offices of THE TOOL ENGINEER magazine will be included on the tour.

The first day of the Leadership Conference has been designated as National Day. A breakfast at the Statler Hotel will open the program, with President L. B. Bellamy delivering the welcoming address. He will introduce the officers and directors of the Society and give a brief summary of the day's activities.

Chapter chairmen will be assigned to groups according to the size of the

chapters they represent, so that they may have more in common with each other at discussion sessions. Various colored badges will distinguish these groups and members of the ASTE official family.

Special buses will take the men from the Statler out to the headquarters building for the dedication ceremonies. They will hear an address by William H. Smila, ASTE president in 1933-34, and witness the laying of the ASTE plaque by W. B. Peirce, president in 1947-48.

The tour of the ASTE building will be followed by luncheon served at the Rackham Memorial Building, headquarters for the Engineering Society of Detroit. The historical aims and achievements of the ASTE will be covered in the luncheon address.

The afternoon program will be conducted by national officers of the Society who will outline in short, concise speeches their duties and responsibilities. Speaking to the group will be: L. B. Bellamy, president; Roger F. Waindle, first vice president; Joseph P. Crosby, second vice president; and Harry B. Osborn, third vice president; H. E. Collins, secretary; Howard C. McMillen, treasurer; and G. A. Rogers, secretary-treasurer.

## Financial Operations

How budgets are established will be covered by William F. Jarvis, chairman of the National Finance Committee. Activities of the ASTE Research Fund Committee will be reviewed by Robert B. Douglas, member of that committee. Functions of the National Professional Engineering Committee will be told by C. M. Smillie, committee chairman.

F. J. Sehn, head of the National Book Committee, will speak on his group's activities while those of the Judicial Committee will be covered by William Smila. Wayne Kay will speak on the work of the National Editorial Committee which he heads, Arthur Diamond will review the programs executed by the National Education Committee, of which he is chairman.

Public relations will be outlined by Leslie Hawes, chairman of the National Public Relations Committee. Work of the Program Committee will be described by James Horne, committee chairman.

The data sheets published by ASTE and other projects of the National Standards Committee will be discussed by R. C. W. Peterson, chairman. The policies of the National Membership Committee will be covered by Committee Chairman Andy Clark. E. H. Ruder, chairman of the National Constitution and By-Laws Committee, will review the activities of his committee.


After a recess from 4:30 to 6 p.m., the president's reception at the Statler will offer a pleasant period of informality. The conference dinner following the reception will also be held at the Statler and will feature an address on the topic "The Importance of the Individual Engineer."

Tuesday's programs have been planned under the heading of "Chapter Day." After breakfast, the first leadership session will be highlighted by a play on "how not to conduct a chapter meeting." Directed in a light vein, the production will have plenty of punch in the dialogue pertaining to the serious matter of good chapter procedure. Another half-hour play on the ideal chapter, and how it is run, will follow.

After a recess, chairmen participating in the sessions will hear talks delivered by the national officers and committee heads who spoke Monday on national organizations, activities and responsibilities. The Tuesday talks will be geared to the individual chapter's role in those same fields of programs, standards, education, constitution and by-laws and the like. Reprinted summaries of all talks will be distributed at the Tuesday luncheon.

That afternoon five simultaneous discussion sessions will be held with about 25 participating in each one. Chairmen of chapters with a membership of 300 to 1,800 will meet with W. G. Ehrhardt, national director and Mr. Bellamy, Mr. Collins, Mr. McMillen and Mr. Diamond.

Chairmen representing groups of 185-300 will hold their meeting with Mr. Waindle, Mr. Rogers, Mr. Peterson, Mr. Douglas and Mr. Ruder. Meeting with National Directors George A. Goodwin and Thomas J. Donovan, Jr., and Mr. Crosby, Mr. Kay and Mr. Clark will be chairmen from chapters with a membership of 125-185 members.

Operations in chapters of 85-125 members will be discussed with National Director Fred J. Schmitt, Mr. Osborn, Mr. Sehn, Mr. Hawes, and Mr. Jarvis. Past President J. J. Demuth, Directors Ben J. Hazewinkel, W. B. McClellan, and Mr. Horne and Mr. Smillie will discuss activities of chapters with 35-85 members.

## Leadership Banquet

President Bellamy will act as master of ceremonies at the Leadership Banquet to be held in the grand ballroom of the Statler Hotel. A 6:30 reception will precede the banquet. Other program notes for the evening list the main speech to be delivered by C. V. Briner, past president of ASTE, and the oath of office to be given by Bellamy.

Although the Leadership Banquet will bring the conference to an official ending, all chapter chairmen are urged to remain for the Annual Meeting, which features this year more than 20 outstanding technical lectures and a host of tours of Detroit plants. Truly, activities of the Annual Meeting and the Leadership Conference will make an unbeatable combination for a most valuable week in Detroit.

**The Annual Nominating Committee gave much deliberation and consideration to the selection of candidates for election to the Board of the Directors of the Society. Pictured at one of the meetings are, from left: D. H. Brighton, H. Dale Long, Chairman H. L. Tigges, R. A. Baker and L. R. McAfee.**

# Candidates Named for Election to ASTE Board

Selection of 21 candidates for election to the Board of Directors has been announced by the Society's Annual Nominating Committee. Ten of these outstanding ASTE members will be elected to office March 18 when the House of Delegates convenes in Detroit at the annual meeting. As indicated in the constitution, President L. B. Bellamy automatically becomes the eleventh member of the new board on the date of his retirement.

Serving on the Nominating Committee were: H. L. Tigges, chairman; and R. A. Baker, D. H. Brighton, L. W. Greenblatt, Jr., H. Dale Long and L. R. McAfee. Their report will be circulated at January chapter meetings so members may study their choice of candidates. Chapter representative to the House of Delegates will be selected at the February meetings.

Additional names will be added to the slate if 20 or more senior members sign a petition for each proposed candidate. All petitions must be received at national headquarters in Detroit by February 1.

For the convenience of TOOL ENGINEER readers, the background and qualifications of each candidate selected by the Nominating Committee is presented on the following three pages for handy reference.

## Incumbent National Officers

**Roger F. Waindle**—First vice president and incumbent director ASTE. Vice president, Cannon Muskegon Corp. and director of research, the Nugent Sand Co., Inc., Muskegon, Mich. Senior member since 1945 and charter member Fox River Valley chapter. Active in chapter affairs and past chapter chairman. Former member, National Finance Committee and past national director (two terms). Active in technical, industrial and military organizations. Holds B.S. degree in mechanical engineering. Registered professional engineer.

**Joseph P. Crosby**—Second vice president ASTE. Vice president and sales manager. The Lapointe Machine Tool Co., Hudson, Mass. Senior member since 1941. Has held chapter committee chairmanships culminating in chap-

L. B. Bellamy

R. F. Waindle

J. P. Crosby

H. B. Osborn

chairmanship. National director (three terms). Wide industrial experience, membership in other trade and professional groups. Active in local civic organizations. Registered professional engineer.

**Harry B. Osborn, Jr.**—Third vice president and incumbent director ASTE. Technical director, Tocco Div., The Ohio Crankshaft Co., Cleveland, Ohio. Senior member since 1943. Has served actively in numerous chapter capacities culminating in chapter chairmanship. Past chairman, National Public Relations Committee (two terms.) Past chairman, National Membership Committee (two terms). Incumbent national director (two terms) and assistant secretary-treasurer. National authority in the field of induction heating. Holder of B.S., M.S. and Ph.D. degrees in chemical and metallurgical engineering. Registered professional engineer.

**Harold E. Collins**—National secretary ASTE. Manager, Process Engineering Dept., Huges Tool Co., Houston, Tex. Senior member since 1939. Charter member, Houston chapter. Active in affairs of Houston chapter. Past chapter chairman. National director (six terms). Member acting in advisory capacity to the Joint Industry Mobilization Group of the Machine Tool Industry. Member of the Tool Committee of the Army Ordnance Association. Industrial executive and tool engineer. Active in affairs of other technical societies.

**Howard C. McMillen**—National treasurer ASTE. Plant manager, Philco Corp., Bedford, Inc. Senior member since 1939. Charter member Evansville chapter. Active in chapter affairs. Past chapter chairman. Wide executive experience in the refrigeration industry. Member, American Society of Refrigeration Engineers. Past chairman of National Finance Committee (three terms), and national treasurer (two terms). Holds B.S. degree in mechanical engineering. Registered professional engineer.

**Gerald A. Rogers**—Assistant secretary-treasurer, and incumbent director ASTE. Sales engineer, Rudel Machinery Co., Ltd., Montreal, Que., Can. Senior member since 1942. Chapter program committee chairman, first vice chairman and chairman of Montreal chapter. Former member and past chairman of National Program Committee. Past secretary of National Membership Committee. Wide industrial experience.

## Directors Nominated for Re-election

**Thomas J. Donovan, Jr.**—Owner, Donovan Co., Philadelphia, Pa. One of three organizers of Philadelphia chapter and has been active in all chapter affairs since. Senior member since 1938. Charter member and past chairman of Philadelphia chapter. Former member of the National Constitution and By-Laws Committee. Incumbent national director (six terms) and past third vice president. Active member of Philadelphia chapter, ASM. Life member of the Army Ordnance Assoc. and The Franklin Institute. Wide industrial and executive experience covering a period of years. Member of Tool and Die Assoc. Active in other technical associations.

**Willis G. Ehrhardt**—Managing partner, Ehrhardt Tool and Machine Co. of St. Louis, Mo. Senior member since 1938. Active in chapter affairs, culminating in chapter chairmanship. Former member of National Membership and Program Committees. Long experience in tool and die field. Past chairman of National Public Relations Committee. Past president of National Tool and Die Manufacturers' Assoc. Member, ASM. Active in civic and technical organizations. Registered professional engineer.

**George A. Goodwin**—Chief process engineer, The Master Electric Co. Dayton, Ohio. Senior member since 1938 and charter member of Dayton chapter. Has served on various chapter committees and as vice chairman and chairman of the Dayton chapter. Past chairman, National Finance Committee. Past national treasurer (three terms) and member of National Finance Committee. Incumbent director (three terms). Has served in various engineering and executive capacities since 1910. Member of Advisory Council on Tool Engineering of Sinclair College. Also active in other technical and civic organizations. Registered professional engineer.

**Ben J. Hazewinkel**—President Daily Grinding, Inc., South Gate, Calif. Senior member since 1942. Instrumental in organization of Denver, Salt Lake City, Los Alamos, Albuquerque and San Gabriel Valley chapters. Served as Denver chapter chairman and delegate and member of National Membership Committee (three terms). Incumbent national director (three terms). Active in local civic organizations. Broad industrial background in tool engineering field.

**Fred J. Schmitt**—Manager, Development and Special Sales, D. A. Stuart Oil Co., Chicago, Ill. Senior member since 1938. Active in numerous chapter capacities culminating in chapter chairmanship of Chicago chapter. Past chairman, National Program Committee and chairman, House of Delegates, 1948. Past National Director (two terms). Active in other technical and executive organizations. B.S. degree in chemical engineering. Broad and varied experience in technical and executive positions.


H. E. Collins


H. C. McMillen


G. A. Rogers


T. S. Donovan


W. G. Ehrhardt


G. A. Goodwin


B. J. Hazewinkel


F. J. Schmitt

## Additional Nominees for Election to the Board

**Lee M. Davis**—Assistant chief engineer, Jones & Lamson Machine Co., Springfield, Vt. Charter member, Twin-States chapter, he has served actively in various chapter capacities, culminating in chapter chairmanship. Presently a member, National Editorial Committee. Extensive executive experience. Active in civic organizations.

L. M. Davis

C. G. Sampson

**Francis E. Gruber**—Vice president and chief engineer, Brown and Bigelow, St. Paul, Minn. Senior member, Twin-Cities chapter since 1938. Past chapter chairman (two terms). Present chapter alternate. Responsible for the development of engineering on plastics and phenol fibre, Western Electric, Chicago. Also specialist on plastic molding. B.S. degree, Valparaiso University. Active in civic affairs.

F. E. Gruber

L. C. Seager

**James O. Horne**—Owner, J. O. Horne Co., Rochester, N. Y. Senior member, Rochester chapter since 1940. Has served the chapter in various capacities including that of chairman. Present chairman, National Program Committee, on which he has served since 1947. Member, Rochester Chamber of Commerce.

J. O. Horne

C. M. Smillie

**Raymond C. W. Peterson**—Owner, Peterson Engineering Co., Toledo, Ohio. Active in chapter affairs since 1945, past chapter chairman, chapter delegate; Chairman, National Standards Committee (two years). Instrumental in the institution of tool engineering course at University of Toledo. Affiliations include: national director, Pressed Metals Institute (three years); American Society of Mechanical Engineers; Ohio Society of Professional Engineers; and B-52 Committee secretary, American Standards Association. Holds B.S. degree in mechanical engineering, University of Toledo. Registered professional engineer.

R. C. W. Peterson

R. A. Smith

**Lawrence J. Rademacher**—President, Stokerunit Corp., Milwaukee, Wis. Senior member Milwaukee chapter since 1943. Past chairman, National Program Committee. Past regional director. Past chairman, Annual Nominating Committee. Assisted in the chartering of the New Orleans and Atlanta chapters. Registered professional engineer.

L. J. Rademacher

Garner Young

**Cecil G. Sampson**—Plant manager, Machine Shop and Stamping Plant, Ford Motor Co. of Canada. Senior member, Windsor chapter since 1942. Occupied various chapter offices culminating in chapter chairmanship. Technical society affiliations include membership in the Society of Quality Control. Member, Windsor Board of Education. Active in civic affairs.

**Leslie C. Seager**—Chief production tool engineer, The Eimco Corp., Salt Lake City, Utah. Active in formation of Salt Lake City chapter and that chapter's charter chairman. Present member, National Professional Engineering Committee. Aided in instituting tool engineering curriculum at Utah State Agricultural College. Promoted first scholarships for Salt Lake City chapter, in tool engineering. Treasurer, Utah Engineering Council. Member, Institution of Production Engineers, Great Britain.

**Charles M. Smillie**—President, C. M. Smillie Co., Detroit, Mich. Senior member Detroit chapter since 1940. Has held various chapter offices including that of chapter chairman. Former member, National Membership Committee (two years). Present chairman, National Professional Engineering Committee. Affiliations include: district chairman, National Screw Machine Products Association; and state chairman, Apprentice Selection Committee, National Association of Manufacturers. Holds B.S. degree in mechanical engineering. Registered professional engineer.

**Richard A. Smith**—Chief tool engineer, Pratt and Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn. Senior member since 1936, he has served Hartford chapter in various capacities including that of chapter chairman. Chapter delegate and past member, Annual Nominating Committee. Is the author of Section 12 of the ASTE *Tool Engineer's Handbook*.

**Gardner Young**—Supervisor, Equipment and Methods Dept., Gearing Div., Westinghouse Electric Corp., Pittsburgh, Pa. Senior member since 1937. Has been prominent in all chapter activities, having served as chapter treasurer, second vice chairman, first vice chairman, chairman and delegate, respectively. Past chairman, National Program Committee. Studied general engineering and mechanics at Coatbridge Technical Institute. Active in numerous civic and technical organizations.

Participants on the panel on professional engineering, from left, were: Prof. L. E. Doyle, H. L. Aglietti, Prof. G. G. Lamb, chairman of the Illinois Professional Engineering Examining Committee, C. M. Smillie, chairman of ASTE's Professional Engineering Committee, Marvin Bunting, H. G. Heimann. Standing, J. D. Schiller, V. H. Gallichotte, L. C. Seager.

## 150 Engineers Attend University Conference

The University of Illinois at Urbana played host November 8 to the second annual Tool Engineering Conference sponsored by the Illinois chapters of ASTE and the university's mechanical engineering department. Up-to-date answers to some of today's most pressing engineering problems were given at sessions attended by more than 150 tool engineers.

A round-table discussion on "Engineering the Carbide to the Job" was conducted by leading authorities representing manufacturers and users of carbides. In a discussion of "The Value of Professional Engineering Registration," officers of the Society and other prominent professional engineers told how tool engineers can benefit from the growing professional engineering movement.

In addition to other topics of pertinent interest, the program included tours of the College of Engineering and a number of activities for the ladies. Roger F. Waindle, first vice president of ASTE, presided at the evening banquet and introduced the main speaker, F. H. Beach, who spoke on "The Eternal Triangle."

Members of the National Education Committee attending the Urbana Conference are pictured with First Vice President Roger F. Waindle, far left. They are: Prof. Frederick Preator, Prof. O. W. Boston, Arthur R. Diamond, chairman of the committee, Prof. J. N. Edmondson and Prof. O. D. Lascoe.

Speakers for the round table discussion on carbides were, from left: Matt Aljanich, L. B. Kozacka, W. L. Kennicott and A. O. Schmidt. Subject of the panel was "Engineering the Carbide to the Job."

Shown at the speakers' table for the noon luncheon are: Harry A. Paine, first vice chairman, Chicago chapter; H. Verne Loeppert, Chicago chairman; Prof. Norman Parker, head of the University of Illinois Mechanical Engineering Dept.; Roger Waindle, first vice president of ASTE; Howard C. McMillen, ASTE treasurer; Dean Everitt, head of the College of Engineering, U of I; and Prof. K. J. Trigger, Mechanical Engineering Dept.

President L. B. Bellamy congratulates Charles Bazaz at the charter night meeting of the Paterson ASTE chapter. Others pictured in the front row: Park Groff, Jr., treasurer; Mr. Bellamy; Thomas J. Donovan, Jr., a national director of ASTE; Mr. Bazaz and Conrad Corsini, first vice chairman. Back row: Sam Boyer, area captain on the National Membership Committee; Claus Bartenstein, secretary; Carl Kertesz, member of the National Membership Committee; and Robert McIlwain, second vice chairman.

Charles Bazaz receives his chairman's pin from President Bellamy.

Carl Kertesz, left, congratulates the Paterson membership chairman, Fred Vestano. The right hand photograph shows the presentation of the gavel to the chairman by Mr. Bellamy and Mr. Donovan.

# Paterson Chapter Sets Record for Charter Members

The chartering of ASTE's 102nd chapter in Paterson, N. J., established a new record for Society historians. When the organization received its charter on November 14, the roster listed more than 230 members, the largest charter membership of any chapter in the Society.

A specially inscribed gavel in recognition of this record was given to the Paterson chapter by L. B. Bellamy, president of the Society, and Thomas J. Donovan, Jr., national director.

Installation ceremonies taking place at the Alexander Hamilton Hotel were conducted by Mr. Donovan. He administered the oath of office to: Charles Bazaz, chairman; Conrad Corsini, first vice chairman; Robert McIlwain, second vice chairman; Claus Bartenstein, secretary; and Park Groff, Jr., treasurer. After giving a brief history of ASTE, Mr. Donovan unveiled the charter and presented it to the chapter.

An address on "The Tool Engineer in Modern Industry" was made by President Bellamy, who emphasized the advantages of active participation in the Society. He presented the chairman's pin to Mr. Bazaz.

The membership kit was given to Fred Vestano, membership chairman, by Carl Kertesz of the National Membership Committee.

Following the chartering activities, a talk on ram jet engines was given by Jack Charshafian, director of development on nonrotating engines at Wright Aeronautical Corp. The lecture was accompanied by sound film.

## Bohle Gives Discussion on Gear Inspection

Worcester—About 75 members and guests of Worcester ASTE chapter turned out on November 4 for the regular dinner meeting at Putnam and Preston's Restaurant.

The dinner was followed by a business meeting and Harold Thompson, editorial chairman, outlined benefits to be obtained by both individual members and the Society through member participation in the work of the editorial committee.

Program Chairman John Rotchford introduced Fred Bohle, manager of the Machine Division, Illinois Tool Works, and chairman of the Inspection Committee of the American Gear Manufacturers Association, who spoke to the chapter on "Gear Inspection." His talk was illustrated in part by slides of gear checking equipment and their methods of use.

**Fred Bohle, manager of the Machine Div., Illinois Tool Works, was the speaker at the November meeting of the Worcester chapter.**

Mr. Bohle's lecture dealt with both functional and analytical gear checking. He explained a combination of functional and analytical checking, which has been found by industry to be the most economical way to avoid costly 100% inspection and yet assure a definite and consistent standard of quality.

A discussion period which followed included the subjects of gear inspection, engineering, and manufacturing, in which Ralph Rawling was an active participant. —*Harold F. Thompson*

Albert M. Sargent

## Bergstrom Elected President of NMTBA

White Sulphur Springs, W. Va.—Swan E. Bergstrom, vice president of The Cincinnati Milling Machine Co. and a member of the Cincinnati ASTE chapter, was elected president of the National Machine Tool Builders Association at its 51st annual meeting held at the Greenbrier Hotel.

Another ASTE member and a past national president of the Society, Herbert L. Tigges was elected first vice president. Mr. Tigges is executive vice president of Baker Brothers, Inc., Toledo.

Other officers of the association were: M. A. Hollengreen, president, Landis Tool Co., Waynesboro, Pa., second vice president and director; and Francis J. Trecker, president, Kearney and Trecker Corp., Milwaukee, treasurer.

New directors elected were: J. C. Cotner, president, The Hydraulic Press Mfg. Co., Mount Gilead, O.; and Alan C. Mattison, president, Mattison Machine Works, Rockford, Ill. Tell Berna was re-elected general manager and Mrs. Frida F. Selber was re-elected secretary.

## Pioneer Engineering Co. Sold by A. M. Sargent

Pioneer Engineering and Mfg. Co., Inc., in Detroit, the largest independent engineering company in the country, has been sold by its president, A. M. Sargent, one of the most outstanding members of ASTE. Mr. Sargent, who founded the company in 1930, plans to establish a consulting engineering service.

Michael Pinto, president of the Douglas Tool Co. and member of the Detroit ASTE chapter, purchased Pioneer and will serve as the firm's new president. Another ASTE member, Clyde Mooney, was named general manager in complete charge of all operations. L. A. Curnoe was named secretary-treasurer.

Mr. Pinto paid high tribute to his predecessor. "Mr. Sargent was not only the first man to recognize the need for a strong independent engineering industry in the manufacturing field," he said, "but he also had the courage to launch it at a time when few people would have ventured into new fields, in the early days of the great depression."

Holder of one of the longest and most illustrious records of service to ASTE, Mr. Sargent was instrumental in the founding of the Society in 1932. He served as the first national secretary from 1932 to 1937 and as national director from 1932 to 1938 and again from 1944 to 1947.

Named second vice president of ASTE in 1944-45, Mr. Sargent was elected first vice president the following year and was named Society president for 1946-47. During his presidency, Mr. Sargent was given an honorary engineering degree from Lawrence Institute of Technology in Detroit. As chairman of the ASTE Headquarters Building Committee, he planned, engineered and supervised construction of the building, for which he was honored by a special resolution by the ASTE Board of Directors in 1949.

During 1945 he developed and organized the Society procedures, doing a great portion of the work personally. A credit to the tremendous job accomplished, those procedures are standing today, substantially as he organized them.

A registered professional engineer, Mr. Sargent served as the first chairman of the temporary committee set up to organize the Research Fund Committee. Through his more than 20 years of ASTE service, he has contributed much to the organization of new chapters. He has always devoted considerable time and financial assistance to the progress of the Society.

**Conducting the October meeting of the Hamilton District chapter was William Shaw, chapter chairman, shown at the microphone. With him at the speakers table, from left, were: C. E. Bulmer, first vice chairman; Frank Sebring, Hydraulic Press Mfg. Co., Mount Gilead, Ohio, guest speaker; John McCutchem, of the Ohio firm; and George Gilmore, past chairman. Another Hamilton past chairman, J. E. Yorick, is in the foreground.**


**Chairman William Rogers, far right, greets National Director Thomas J. Donovan, Jr., center, at the November meeting of the Long Island ASTE chapter. Pictured with them is Arthur Cervenka, first vice chairman.**

## Society to Receive Public Relations Award

A certificate for achievement in public relations will be presented to ASTE by the American Public Relations Association at its annual convention being held in March in Washington, D. C.

The award will be made specifically for the outstanding public relations program executed for the 1952 ASTE Industrial Exposition by Denham and Co., public relations counsel for the Society. The firm is headed by Athel F. Denham.

## Pittsburgh Members Hold Executives' Night

Pittsburgh—National President L. B. Bellamy, Past President W. B. Peirce and 50 other top executives were guests of the Pittsburgh chapter at the November 7 meeting held at Hotel Webster Hall. Designated as "Executives' Night," the meeting was attended by well over 200 persons.

The evening's program was highlighted by talks by J. R. Weaver, assistant to the vice president in charge of manufacturing at Westinghouse Electric Corp. and a past president of ASTE, and Philip McKenna, president of Kennametal, Inc.

Mr. Bellamy gave an address on "Tool Engineering in Industry" and reported on the Society's recent semi-annual meeting held in Buffalo.

In his address on "What Tool Engineering Can Do for Your Company," Mr. Weaver discussed the development of tool engineering and pointed out the benefits derived from the profession, not only to the individual, but to industry and the nation as well.

*—E. L. Caughey*

## London-St. Thomas Members Hear Voudas

London, Ont.—The November 20 meeting of the London-St. Thomas chapter was held at Cobble Stone Inn and featured a talk by James Voudas, chief engineer, Bullard Co., Bridgeport, Conn. About 80 members were present for the technical session.

Mr. Voudas explained the workings of the Man-Au-Trol, the latest automatic turret lathe manufactured by his firm. He told how the machine can be set up for small jobs run on a manual operation and not disturb the automatic setting in any way. The machine is operated by hydraulic, electrical and mechanical devices. Interlocking switches are used to insure safety.

Other guests at the meeting were H. E. Neale, assistant sales engineer with the Bullard Co., who gave a talk on the firm's history and showed a movie, and Ray Hill, district representative with Bullard.

*—Robert Fraser*

## Donovan Speaks to Long Island Chapter

Garden City, N. Y.—Thomas J. Donovan, Jr., a national director of ASTE, was the guest speaker at the November 10 meeting of the Long Island chapter held at the Garden City Hotel. He outlined the latest activities of the Society, including the establishment of the $75,000 Research Fund and the increase of ASTE education aid to ten annual awards of $700 each. Mr. Donovan also presented a short history of the Society and told of the chartering of ASTE's 102nd chapter.

He presented an ASTE *Handbook* to Mrs. Sara T. Moxley, chairman of the editorial committee, in recognition of her excellent work on the chapter bulletin.

Other guests at the meeting were Samuel R. Boyer, past chairman of the Philadelphia chapter and member of the National Membership Committee, and L. D. Iadisernia, editor of the bulletin for the Greater New York ASTE chapter.

The nominating committee of the Long Island chapter was elected at the meeting and includes Don L. Griffing as chairman and Henry Maehl and Max Stein as other members.

*—Sara T. Moxley*

## National Director Visits Racine Chapter

Racine, Wis.—Fred J. Schmitt, a national director of the Society, was an honored guest at the November 30 meeting of the Racine ASTE chapter. He spoke to an audience of nearly 100 members and guests on the national activities of ASTE and gave a few remarks on the semi-annual meeting held in Buffalo.

Technical speaker at the meeting was Harry Conn, chief engineer of Scully-Jones and Company, who presented a program on tooling production problems.

**More than 200 members and guests were present for the Executives' Night meeting of the Pittsburgh chapter held November 7. Seated at the speakers' table were, from left: W. S. Risser, Westinghouse Electric Corp.; Philip M. McKenna, president of Kennametal and coffee speaker; J. R. Weaver, assistant to the vice president in charge of manufacturing at Westinghouse and main speaker; Fred Hennig, Jr., chapter chairman; L. B. Bellamy president of ASTE; and W. B. Peirce, past president of the Society.**

# Phoenix ASTE Chapter Re-Activated November 10

## Hazewinkel and Ewing Officiate

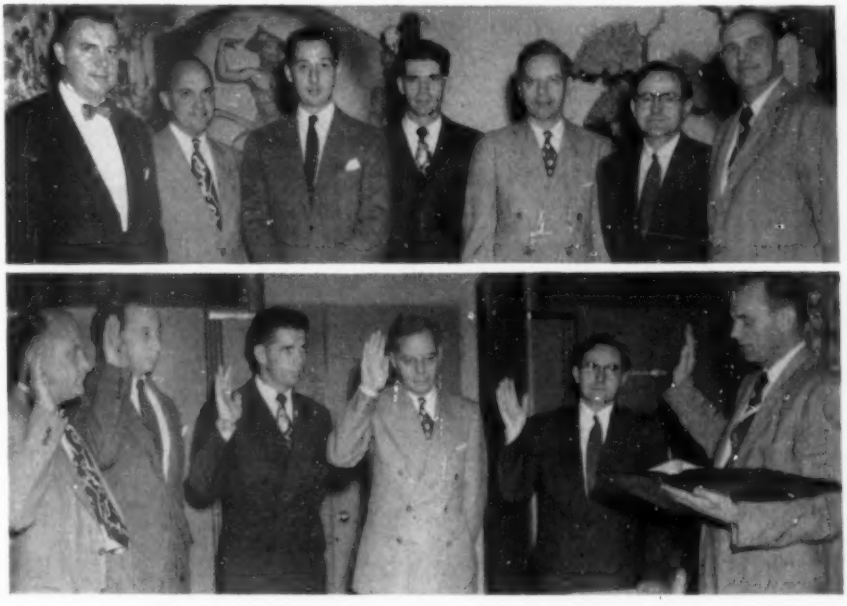
Holding the original ASTE charter of the Phoenix chapter are, from left: Ralph Ewing, Chairman Harry Rives and Ben J. Hazewinkel.

At a special meeting held on November 10, the ASTE chapter in Phoenix, Arizona, again became an active organization in the Society's large family of chapters. Officiating at the ceremonies were Ben J. Hazewinkel, national director, and Wayne Ewing, vice chairman of the National Membership Committee.

The Phoenix chapter was originally chartered in April, 1945 and became inactive in March, 1947, when war contracts were cancelled and much of the local industry left the city. There are now about 25 firms permanently located in Phoenix.

A total of 70 members and guests witnessed the presentation of charter number 67 and the installation of chapter officers by Mr. Hazewinkel. The chairman's pin was presented by Mr. Ewing. The value of belonging to the Society was discussed in talks given by the two national representatives.

Officers of the chapter are: Harry Rives, chairman; Chester Vermilyea, first vice chairman; Francis Norr, second vice chairman; Ray Merkle, secretary; and Carl Weingartner, treasurer.



Lower photo—Mr. Hazewinkel, a national director of the Society, administers the oath of office to Phoenix officers. From left: Harry Rives, chairman; Chester Vermilyea, first vice chairman; Francis Norr, second vice chairman; Ray Merkle, secretary; and Carl Weingartner, treasurer. Top photo—Ralph Ewing, vice chairman of the National Membership Committee, far left, joined the chapter officers and Director Hazewinkel for a group picture after the installation. He presented the chairman's pin at the ceremonies to Mr. Rives to wear during the current term of office.

# ASTE Data Sheets Used at Detroit Diamond Meeting

Detroit—ASTE data sheets on industrial diamonds figured prominently at a recent meeting of Detroit area manufacturers, officials of the United States Department of Commerce and the Metals and Minerals Bureau of the NPA. All those participating received the sheets on diamonds from the ASTE data book for reference at the conference.

Government representatives, telling what a high percentage of industrial diamonds the United States is now using in comparison to other nations, said there can be no more than 72 carats per cubic inch of diamond bearing surface in diamond wheels. No comment was made on how few diamonds can be used, but it was noted that some imported wheels have been found to contain as few as 27 diamond carats.

Outlining their program for diamond conservation, manufacturers told of recovering diamonds from sludge. A diamond reclaiming firm stated that no charge is made for labor involved in checking for diamonds in sludge so "there is everything to gain and nothing to lose."

The data sheet on diamonds is just one of those made available by ASTE and its National Standards Committee. A complete list of all data sheets that have been reprinted under the data sheet reprint program can be found on page 193 of the December issue of THE TOOL ENGINEER.

NSC with the help of the manufacturers concerned, has developed and executed this program to get into the hands of all new members and those older members who wished them, all data sheets that have been issued under the numerical indexing system instituted in 1946.

Any member may receive any of these sheets that are missing from his binder by advising the National Standards Committee, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

**The program for the Executives' Night meeting of the Indianapolis chapter was presented by two national officers of the Society. Roger F. Waindle, second from right, first vice president, gave the major address, and Howard C. McMillen, far right, ASTE treasurer, acted as toastmaster for the evening. Shown with them, from left, are Denis White, chapter chairman, and Halsey F. Owen, professor of industrial engineering at Purdue University.**

## Harry Conrad Makes Education Awards

Midland, Mich.—"Awards for Scholarship Attainment" were made at the November meeting of the Saginaw Valley chapter by Harry E. Conrad, executive secretary of ASTE. The four winners are students at General Motors Institute in Flint. They are: Robert G. Dutro, Richard Heidtman, Neil J. Stalker and Robert H. Kamm.

All were presented a year's membership in the Society, an ASTE pin and a copy of *The Tool Engineers Handbook*. In addition to his prizes, Mr. Kamm, a fifth year student, was given a booklet of dinner tickets for the regular meetings of the Saginaw Valley chapter. Award winners were announced by Edward A. Reed, chairman of the chapter's education committee.

Other highlights of the meeting included a tour of the Dow Chemical Co. plastics technical laboratory and Dow's sales department offices which are completely finished and furnished with plastic materials.

Gordon B. Thayer, head of the molding section, plastics technical service at Dow, spoke on plastic molding and showed a film which illustrated the actual flow of pastic material into the molding dies through a glass wall in the molding die. —*Ben Phillips*

## Cox Named President of Metal Treating Institute

A. M. Cox, president of the Pittsburgh Commercial Heat Treating Co. and a member of the Pittsburgh ASTE chapter, has been elected president of the Metal Treating Institute at its annual meeting in Philadelphia. He is also president of J. P. Devine Mfg. Co. and Pittsburgh Wire Form and Mfg. Co.


## Positions Available

ENGINEERING LEADERS FOR SPECIAL MACHINERY DESIGN—Engineering squad leaders for builders of special machine tools. Must be thoroughly exprienced in machine design, fixture design, multiple-drill head design and capable of program leadership. Permanent employment with prominent manufacturing company located in pleasant mid-west city. Unless you are qualified, please do not apply. Write to Box 508, The Tool Engineer, 107000 Puritan Ave., Detroit 21, Mich.

TOOLROOM SUPERINTENDENT—Man with ability to supervise the building of roll form dies, flat bed dies and bending fixtures for the fabrication of metal moldings. Also ability to estimate tooling cost desired. Salary commensurate with ability and experience. Write Box 510, The Tool Engineer, 10700 Puritan Ave., Detroit 21, Mich.


## Rowe Talks on Tungsten Carbide Applications

Newark, N. J.—A number of outstanding speakers have been featured on fall programs of the Northern New Jersey ASTE chapter. Meeting at the Hotel Robert Treat in Newark, members heard C. G. Rowe of Allegheny Ludlum Steel Corp. speak on "Tungsten Carbide for Die Applications" at their November technical session.

The October meeting featured a talk on application of band tools to modern industry by Frederick Hutchinson of the DoALL Co. The lecturer in September was E. Von Hambach, Carpenter Steel Co., who spoke on "Tips on Application and Fabrication of Stainless Steel."

Most of the programs included the showing of slides or motion pictures. All were highlighted by question and answer periods. —*Anthony F. Cuoco*

## Waindle, McMillen Visit Indianapolis Chapter

Indianapolis—Guests at the November 6 meeting of the Indianapolis chapter were Roger F. Waindle, first vice president of ASTE, and Howard C. McMillen, treasurer of the Society. The occasion was the annual Executives' Night program.

Mr. McMillen acted as toastmaster for the evening. The principal talk was made by Mr. Waindle who spoke on the past, present and future of ASTE.

—*Richard A. Garber*

## Discusses High Cost of Industrial Accidents

Brantford, Ont.—Hamilton District chapter members and guests heard a talk on safety in tool engineering delivered at their November 14 meeting. Speaker was F. W. Mulvale, director of safety, McKinnon Industries, a division of General Motors. The dinner meeting was held at the Brant Hotel.

After an introduction made by Ralph Fechnay, Mr. Mulvale pointed out the tremendous cost of industrial accidents every year. He urged regular meetings to emphasize the importance of never-ending vigilance for safety. He discussed such preventive measures as safety shoes, and clothing, proper guards on machines and following safe practice in all tool design. Films were used for illustration.

On November 20, about 125 couples enjoyed the chapter's autumn dance. Morgan Thomas and his orchestra provided the music.

The October meeting of the Hamilton District chapter was held in the Elizabeth Room of Fisher's Hotel. The technical program was presented by Frank Sebring, Hydraulic Press Mfg. Co., Mount Gilead, Ohio. He described in detail the history and development of the HPM Fastraverse press. The speaker was introduced by Clarence Bulmer.

Awards, resulting from the chapter's scholarship fund campaign, were made to Reginald Peace, F. Catina and J. Edmison. The campaign was handled by Jack Yorick, John Snyder, George Churchill, Clarence Bulmer, Ralph Fechnay, Jim Hodgson, John Fowlie.

—*John Litwin*

## Forms New Company

Cecil M. Laughter, charter member of the Dayton chapter, has established a tool designing company under the name of Montgomery Tool & Design, Inc. He is serving as president and general manager of the new firm. For the past 17 years, he has been general manager of the Tool Div., Acme Aluminum Alloy, Inc.

## ong Beach Adds 40 ew Members to Roster

Los Angeles—A record-breaking attendance of 320 members and guests were on hand for the November meeting of the Long Beach chapter held at the Los Angeles plant of the Goodyear Rubber Co. A highlight of the evening's program was the presentation of awards to members leading in the chapter's membership campaign.

Forty new members have been added to the roster. The champion "new member getter" thus far is Al Watts who has 15 to his credit.

The manufacturing facilities of the Goodyear plant were toured after dinner in the company cafeteria. Members and guests were shown the processes in making tires, tubes, rubber hose and foam rubber from crude rubber and latex. —*Wilson C. Irby*

## E. C. Polidor Presents Two Technical Programs

Montreal, Que.—Another duplicate program was offered by the Montreal chapter in November. E. C. Polidor, chief engineer, Optical Gaging Products, Inc., Rochester, N. Y., spoke November 12 at St. Johns, Que., and repeated his lecture the following night at Montreal Technical School. A total of 168 members and guests heard his address on inspection by optical projection.

Mr. Polidor told of the equipment required for inspection of various component parts and of their special features, stressing the importance of inspection by optical projection during the present preparedness program.

Refreshments were served at the meeting by the A. C. Wickman Co. of Canada, Ltd. —*F. W. Winkworth*

## Goddard Speaks at Tri-Cities Session

Rock Island, Ill.—A technical program presented by L. H. Goddard, vice president in charge of engineering, Goddard & Goddard Co., Detroit, was the main feature of the Tri-Cities chapter meeting held at the Rock Island Arsenal in November. More than 60 guests and members attended the session.

Mr. Goddard gave a talk on the various types of milling cutters, their designs and uses, as well as speeds, feeds, horsepower requirements, cutter life and micro finish to be expected. His talk was accompanied by a film showing unusual designs and applications of milling cutters. An informal question and answer period followed the lecture. —*Melvin Winterlin*

**Ralph Pratt, technical speaker at Fort Wayne's November meeting, shows features of high-speed camera to Blaine I. Garard, second vice chairman of the chapter.**

## Ralph Pratt Discusses High-Speed Photography

Fort Wayne—About 40 members of the Fort Wayne ASTE chapter gathered at the Chamber of Commerce Building for the November 12 technical session. Past Chairman Ralph J. Didier presided in the absence of the present chairman, Everett R. Keese.

A minute of silence was observed by the chapter in memory of Edward G. Chambers, Fort Wayne member since 1942, who died unexpectedly on October 27. (Ed. note: see obituary on page 95.)

The technical program was presented by Ralph Pratt, industrial representative for Eastman Kodak, who discused "High-Speed Photography in Industry." Reginald S. Carrol gave a coffee talk on civil defense. —*Eugene T. O'Keefe*

## Baltimore Chapter Tours Crown Cork & Seal Co.

Baltimore—Facilities of the Crown Cork & Seal Co. were toured October 1 by more than 100 ASTE members of the Baltimore chapter. After registering in the lobby of the machinery division, the visitors were served dinner in the firm's cafeteria.

The company manufactures bottling filling equipment, builds some of its own machinery, fills government contracts and does subcontracting for other large firms.

The tour was conducted for small groups of no more than ten members. All had opportunity to study the many operations performed. They observed the toolroom, finished store room, raw materials stores, heat treating, polishing and various machine group sections.

On completion of this part of the tour, the visitors drove about a mile to the closure division and saw how Crown corks and caps are made.

—*LeRoy L. Rubright*

## ASA Service Award Presented to Peterson

R. C. W. Peterson, chairman of the National Standards Committee of ASTE, has been awarded a certificate of service by the American Standards Association. Mr. Peterson, who represents ASTE on the ASA Standards Council, has been especially active as secretary of the Committee on Classification of Materials for Tools, Fixtures, and Gages.

**This group, one of several from the Pontiac ASTE chapter, took time off from regular meeting procedures November 12 to get the inside details on how Carboloy, in Detroit, uses powder metallurgical techniques in making its cemented tungsten carbides. Shown here watching an electronically controlled automatic brazing operation in which carbide tips are fixed on masonry drills are, left to right: George Bryan, membership chairman; John Fritcher; Edward Lesnick; Richard H. Parsons, standards chairman; John Czarnecki; Jerry Robinson, Carboloy representative; and Cash Bond.**

## Toledo Members Tour Baker Brothers Co.

Toledo—The first plant tour of the season was held November 21 for members of the Toledo ASTE chapter. Baker Brothers Co. was host for the visitation. More than 80 members and their guests participated.

Welcoming the group was Herb L. Tigges, past national president of ASTE and executive vice president, Baker Brothers. About 20 engineers and foremen from the plant acted as guides, explaining the unusual machining and assembly operations, including operation of a SIP Hydroptic jig borer.

The company manufactures drill presses, plastic presses, special multi-unit drilling machines, contour grinders, keyseaters and the Tru-Edge shear, all of which were seen in various stages of construction and also in operation.

Refreshments were served, followed by moving pictures of SIP products and in action.

On November 12 the chapter met at the Maumee River Yacht Club for a joint technical session with the Toledo chapter of the Pressed Metal Institute. Acting as toastmaster was Mr. Tigges. Elmer L. Faber, chapter chairman, announced the opening of a membership drive featuring the slogan "440," a goal of 441 members on the chapter roster in two months.

The speaker, M. D. Verson of the Verson Allsteel Press Co., was introduced by Lewis C. Pascoe, program chairman. Two informative movies on "Presses and Tooling at Maytag" and "Transmat Presses and Tooling" were shown. They were followed by a discussion period moderated by Mr. Verson who was assisted by E. J. O'Connell.

*—C. C. Hartwig*

## Shell Mold Process Explained by Purman

Pontiac, Mich.—ASTE members of the Pontiac chapter met October 13 at the Old Mill Tavern in Waterford for their regular dinner meeting and technical session.

Among the 60 members and guests present were W. Domidian, general sales manager, Kencroft Malleable Co., Buffalo, N. Y., and Marvin Bunting of the national headquarters staff who gave a report on the October meeting of the Board of Directors.

Principal speaker was A. E. Purman, district sales manager, Kencroft Malleable Co., who spoke on the shell mold process and its effect on tool engineering. He showed samples of parts cast by this process and exhibited actual mold. The technical program was concluded with a stimulating question and answer period. *—T. R. Gibson*

**A talk on "Hi-Altitude Research" was presented at the November 13 meeting of the Denver ASTE chapter. The program speaker was Prof. Byron Cohn, chairman of the Inter-University Hi-Altitude Research Laboratories for the University of Denver. Pictured here, front row, from left: Prof. Cohn, F. J. Geoffroy, chairman, and Alex Wilcox, program chairman. Top row: Elmer Burger, constitution and bylaws chairman; George Buckel, treasurer; Willard Axtell, past chairman, and Clint Helton, first vice chairman.**


### Situation Wanted

AS MASTER MECHANIC OR TOOL SUPERVISOR—By man with over 25 years of experience as toolmaker, tool designer, processing, expediting and trouble shooting on machine tools and dies. Twelve years in supervision and educational work; teaching tool engineering in night schools. Prefer position in small to medium-sized plant or one with similar responsibilities and salary. Box 300, The Tool Engineer, 10700 Puritan Ave., Detroit 21, Mich.


## Fort Wayne to Celebrate Tenth Anniversary

Fort Wayne—The tenth anniversary of receiving their ASTE charter will be marked by members of the Fort Wayne chapter by a special meeting on February 11. All past chairmen will be honored at the celebration to be held at the Chamber of Commerce.

An outstanding program is being planned for the event. Dinner, with the chapter footing the bill, will be served at 6:30 p.m. Special entertainment will be substituted for the usual technical session and the annual election is also scheduled. *—Eugene T. O'Keefe*

## Steel Plant Toured

Williamsport—A tour of Bethlehem Steel's Wire Rope plant, the largest single facility of its type in the country, made up the ASTE program for the November 10 meeting of the Williamsport chapter. More than 70 members and guests participated in the tour and saw the movie on Bethlehem Steel entitled "Ropes of Steel.—*Leonard Kline*

## South Bend Members Hear Verson Program

South Bend—The November meeting was held at the Isaac Walton League clubhouse and featured a talk by E. J. O'Connell of the Verson Allsteel Press Co. of Chicago. The technical session was devoted to stamping dies and included the showing of a film on presses and tooling at Maytag. A question and answer period proved to be a lively one.

The South Bend chapter is encouraging early dinner reservations by awarding a prize at each meeting to a member who made his reservation before a certain deadline. Attendance is being stimulated by awarding another prize to one of the attending members at each session held by the chapter.

*—E. J. Nelson*

## Handbooks Presented to 14 College Graduates

Providence—Copies of *The Tool Engineers Handbook* were presented October 6 by the Little Rhody ASTE chapter to 14 students who have completed a four-year course in tool design at the Rhode Island College of Education. The awards were made at the regular meeting of the chapter held at Oates Tavern. About 80 members were present.

The technical session was presented by John L. Schwab, president, John L. Schwab & Associates, Bridgeport, Conn., who spoke on "The Tool Engineer in Modern Management." He explained the measurement of human effort and the effects of proper coordination on tooling. His talk was illustrated with motion pictures. *—Guido De Angelis*

## Boston Speakers Discuss Hydroform

Boston—An unusually informative technical program was presented for the 200 Boston ASTE members who attended the November 13 meeting held at New England Mutual Hall. Speakers were Carl E. Bacon of General Electric Co., who spoke on "Hydroform Applications," and Charles Heimlich of Cincinnati Milling Machine Co., who talked on "Hydroform Principles and Applications."

As an added feature, Karl G. Nowak of Fenwal, Inc., and second vice chairman of the chapter, presented a discussion on "What's in The Works."

The meeting was opened by First Vice Chairman Wilfred Wells who conducted the meeting for Harold Seekins who was unable to attend. The speakers were introduced by N. W. White, technical chairman for the chapter.

*—Harry Midgley*

## November Program Draws 100 New Orleans Members

New Orleans—Approximately 100 members and guests of the ASTE chapter in New Orleans met November 19 at Tulane University for a technical session on "Deep Drawing with Tungsten Carbide Dies."

The program speaker was Arthur E. Glen, manager of die sales for the Carboloy Dept., General Electric Co., Detroit. Introducing his talk with a brief history of carbide drawing dies, Mr. Glen's discussion included blanking application, blanking and drawing, and heading dies used in the manufacture of screws, bolts and fasteners.

He illustrated his address with a screen presentation of actual photographs showing various applications in industrial production. A question and answer period provided a lively conclusion to the technical program.

The speaker was introduced by Program Chairman John Sale. Chairman J. R. Cypher introduced six new members and several distinguished guests to the chapter. *—John Sale*

## Des Moines Members Hear Talk by Anthony Zamis

Des Moines—A comprehensive talk on the problems of design, manufacture and inspection of gears was given November 19 for more than 75 members of the Des Moines ASTE chapter. Technical speaker at the meeting was Anthony Zamis, chief engineer, Illinois Tool Works, Chicago. Dinner was served at the Hotel Kirkwood before the technical session got under way.

*—George M. Ruby*

Karl G. Nowak

## Jack Welch Speaks to Fairfield County Members

Bridgeport, Conn.—The November meeting of the Fairfield County chapter was held at the Hitching Post Inn. Some 115 members were on hand to hear a talk by Jack T. Welch, manager, machine tool sales, Sheffield Corp., Dayton, Ohio.

Mr. Welch spoke on "Crushtrue Forming of Abrasive Wheels and Application of the Process." Illustrating his program with slides, he discussed the methods of application to both cylindrical and flat work and described the many types of work now utilizing this process.

A film on jet propulsion, shown to the chapter, gave fundamental information about the principles of jet propulsion and the basic operation of the jet engine. *—John Bodnar*

## Program on Army Presses Attracts Large Audiences

Dayton—One of the year's most outstanding programs was presented to 250 members and guests of the Dayton ASTE chapter when representatives of the E. W. Bliss Co., Kaiser Aluminum and Chemical Co., and the U. S. Air Force discussed the Army's heavy forging press program at the November 10 technical meeting. Guests included contingents from the Columbus, Cincinnati, Springfield, and Richmond ASTE chapters; representatives from the National Production Authority; as well as staff writers from many metalworking magazines and newspapers.

Addresses were given by Col. Wilbur R. Carter, chief of the Industrial Branch, Production Resources Div., Wright-Patterson Air Force Base; E. A. Irwin, general sales manager, E. W. Bliss Co., Canton, O.; and R. S. Moore, plant manager, Heavy Forging Press Plant, Kaiser Aluminum and Chemical Co., Newark, Ohio.

Col. Carter outlined the history of the heavy press program and told of the difficulties involved in getting it under way. He also described some of the uses of the heavy forging presses and outlined their advantages over present methods of production.

In his talk Mr. Irwin discussed the production of the 35,000-ton and the 25,000-ton press. The operation of the Newark plant was described by Mr. Moore. An impromptu talk on transportation problems was given by M. A. York, Salem division traffic manager.

*—W. J. Killinger*

**An audience of 250 Dayton ASTE members and guests heard the program on heavy presses presented at the November meeting. Participants in the session were, from left: Col. W. R. Carter of Wright-Patterson Air Force Base, E. A. Irwin of E. W. Bliss Co. and R. S. Moore of Kaiser Aluminum and Chemical Co. The meeting took place at the Miami Hotel.**

## R. A. Smith Addresses Hartford Carbide Chapter

Hartford, Conn.—Richard A. Smith, chief tool engineer, Pratt & Whitney Div., Niles-Bement-Pond Co., and a past chairman of the Hartford ASTE chapter, addressed members of the Hartford chapter of the American Carbide Society at their November 13 meeting.

Speaking on the application of carbide to deep-hole drilling, Mr. Smith gave a general background of deep-hole drilling techniques. He told of the trouble encountered and the application of carbide to overcome these difficulties.

Variations in carbide tooling, including trepanning of deep holes, were discussed by Mr. Smith.

*—John Hand Conard*

## Atlanta Chapter Holds Joint Meeting with ASM

Atlanta—A joint session with the Georgia chapter of ASM was held by Atlanta members November 17 at the Elks Club. About 60 men attended the dinner meeting.

The program speaker was Dan Smatherton, field engineer, Wendt-Sonis Co., Hannibal, Mo., who presented a talk on carbide tools. The lecture was accompanied by movies which illustrated the manufacture of carbide tool tips and the sharpening, care, and use of carbide tools.

During the general discussion period, Mr. Smatherton was assisted by the firm's sales manager, George Herrick.

The meeting was highlighted by the presentation of an ASTE past chairman's pin to the previous chapter chairman, Clarence Redfern. First Vice Chairman Charles Toney made the award. *—J. L. Morris*

**Examining a tap driver at Peoria's October meeting are, from left: Ray Zimmerman, first vice chairman; Bernard Better, director of research at Scully-Jones and Company and program speaker; and Edward Weber, technical chairman for the evening. The meeting drew an attendance of 200.**

## Peoria Speaker Discusses Research Developments

Peoria, Ill.—An audience of 200 members and guests of the Peoria ASTE chapter was present for the October dinner meeting held at the New Sazarac. Edward Weber was technical chairman for the evening's program.

"Production Tool Developments" was the subject covered by Bernard Better, research director of Scully-Jones and Co., Chicago. With the help of slides, Mr. Better explained all of the varied steps in the development of a new tap driver by Scully-Jones. He pointed out that often certain phases of research are dropped and later found to be usuable. *—Eugene R. Martin*

## Wax Lubricants Topic at Rochester ASTE Meeting

Rochester—About 70 members of the Rochester chapter met at Bernard's Exempt Club for the November dinner and technical session. Program speaker was Ray W. Schimming, regional supervisor, Industrial Products Div., S. C. Johnson & Son, Inc. His topic was "Wax Lubricants, Their Application and Uses."

Discussing the development of special blends of waxes used as lubricants for forming and shaping metals, Mr. Schimming said their use in deep drawing of various metals proved it was possible to draw deeper shapes without annealing or reapplying the wax between draws in multiple drawing.

He used samples of work to illustrate what could be done with wax lubricants.

*—Paul Bruno*

## Method of Reasoning for Tool Design Discussed

Columbus—Joseph I. Karash of the Reliance Electrical and Engineering Co., Cleveland, was the program speaker at the November 12 technical session of the Columbus chapter. He spoke to an audience of 28 ASTE members and guests on the topic "Method of Reasoning for Tool Design."

A guest at the meeting, held at the Columbus Maennerchore, was Dale Burke, area captain of the Society's national membership committee.

The October meeting of the Columbus chapter featured a talk on presses geared for automatic production. Technical speaker was William Schug, general sales manager of the V & O Press Co., Hudson, N. Y. About 30 members of the Columbus chapter attended the session. *—Roscoe Zwoll*

## Motor Applications Reviewed by Aynes

St. Louis—"Tailoring Motors to the Application" was the subject of M. F. Aynes, assistant sales manager, The Louis Allis Co., Milwaukee, when he spoke to the St. Louis ASTE chapter. About 125 members and their guests heard his lecture at the November meeting held at the DeSoto Hotel.

Beginning with the old method of power delivery to machines by use of line shafts and the like, Mr. Aynes gave a brief history showing the development of the built-in motors used today. He explained auxiliary ventilation and the special design necessary to permit long-life operation of motors under severe conditions.

Slides pictured special applications requiring design necessary to put a certain horsepower in a given amount of space. *—Harold W. Bachman*

**For the first time in its history, the St. Louis ASTE chapter has awarded two scholarships worth $400 to outstanding university students. Pictured with Lou Greenblatt, center, chairman of the chapter's education committee and a member of the National Editorial Committee, are the two recipients of the awards: Donald Fogarty of St. Louis University and Frederick Parker of Washington University.**

## iscusses Titanium for et Engine Production

Los Angeles—Vern Coughlin, facili- engineer in charge of staff opera- n, General Electric Co., Lynn, Mass., oke to an audience of 200 members nd guests of the Los Angeles ASTE apter at the November 13 meeting. le discussed "Introduction of Titanium n Jet Engine Production," covering forging, machining, grinding and form- ng of titanium and its alloys.

The extreme stringiness and tough- ness of this metal demands a superfine finish to cutting edges of carbide tipped tools and an abundant supply of water soluble oil. Slides and motion pictures illustrated Mr. Coughlin's talk.

*—S. H. Parsons, Jr.*

## ASTE Program Features Speech on Hydroblasting

Washington, D. C.—"Hydroblasting in Industry" was the program subject at November 6 meeting of the Potomac ASTE chapter. About 50 members met for dinner and the technical session at the Hamilton Hotel.

In his talk, W. I. Gladfelter, chief engineer, Pangborn Corp., Hagerstown, Md., showed large diagrams of various types of blasting equipment, emphasizing the adaptations for hydrofinishing. The scope of hydrofinishing covers deburring, heat scale removal, surface preparations for electroplating or other coatings; tool mark removal, sizing of thread members and die finishing as well as maintenance cleaning.

There is no limitation relative to the size of work to be processed, Mr. Gladfelter said. Hydroblasting machinery is being built on full room scale with a mobile operating cage operating along the four walls. Conveniences include water rinses for the windows and floodlights for illumination.—*E. C. Austin*

### *Obituaries*

***J. A. Kroll***

J. A. Kroll, secretary of the New Haven, Conn. ASTE chapter, was killed and his wife seriously injured in an automobile accident on November 10.

Mr. Kroll was plant superintendent of the Atlantic Saw Mfg. Co. A senior member and past editorial chairman of the New Haven chapter, he was also a member of the American Society for Metals.

***Edward G. Chambers***

Edward G. Chambers, member of the Fort Wayne ASTE chapter, died suddenly on October 27. He was a senior member of the Society and joined the Fort Wayne chapter in May, 1942.

Mr. Chambers was a sales engineer for Oatis Machinery Co. and a registered professional engineer.

**Scully's Cafe was the setting for the November technical meeting of the Los Angeles chapter. Participants included, from left: Ralph L. Chrisse, chairman; Vern Coughlin, facilities engineer, General Electric Co.; Dan Campbell program chairman; and S. W. Winquist, education chairman.**

## New Yorkers Hear About Die Hobbing, Mold Design

New York City—A technical program on die hobbing and mold design was featured at the November 3 meeting of the Greater New York ASTE chapter. The meeting, held at the New York Times Building, was attended by more than 150 members and guests. Half the audience was on hand for the dinner which preceded the session.

Speakers were Islyn Thomas, general manager, and E. W. Spitzig, chief engineer at the Newark Die Co. The lecture was given in the form of a discussion between the two speakers. The audience was encouraged to ask questions during the showing of slides.

Mr. Thomas prefaced his talk with a few remarks on machine tools built in Europe. He said tools built in Europe from blue prints sent from America are often disappointing. One reason for this is that Europeans do not use the same system in making drawings as we do, which causes many misinterpretations. *—Robert Frechman*

## Hartford ASTE Chapter Meets with ASM Members

New Britain, Conn.—A combined attendance of 250 members of the Hartford chapters of ASTE and the American Society for Metals was present for the program on "Metal Cutting Lubricants and Coolants" held November 11 at the Hedges. Dinner preceded the technical session.

Speakers were Paul N. Brunberg, president $CO_2$ Development Corp., Detroit, and C. D. Flemming of the technical service dept., Socony-Vacuum Laboratory, Brooklyn, N. Y. Technical chairman was Henry Fischbeck, supervisor of Advanced Metallurgy Group of Production Engineering Section, Pratt & Whitney Aircraft.

Mr. Flemming presented a general discussion of petroleum metal-cutting lubricants and coolant. He told of the advantages and disadvantages of the several types of soluble and nonsoluble oils currently in use.

Mr. Brunberg presented a progress report on the development of $CO_2$ as a cutting lubricant or coolant, outlining its special application to so-called nonfree machining alloys such as titanium and austenitic stainless steels. He reported on the machining of nonfree machining stainless steel at room temperature at speeds of 1100 surface feet.

"Present limitations appear to be largely economic due to limited availability of the $CO_2$," Mr. Brunberg said, "although the equipment required for application of the technique is relatively simple and inexpensive.

"Provided that further experimentation bears out these present findings, economic factors will be improved and $CO_2$ as a cutting lubricant or coolant may establish another milestone for the tool engineer in the goal of increased production of tough materials at lower cost." *—John Hand Conrad*

**Pictured at the November 3 meeting of the Rochester ASTE chapter are, from left: Charles DeMartin, chapter chairman; Ray W. Schimming, regional supervisor, Industrial Products Div., S. C. Johnson & Son, Inc.; and Donald F. Kohler, first vice chairman. A 6:30 dinner preceded the session.**

## Dawson Addresses Nashville Members

Nashville—The October meeting of the Nashville chapter of ASTE was held at the Andrew Jackson Hotel and attended by 35 members. After the dinner, Chairman John Gipson introduced the technical speaker, Walter R. Dawson, field engineer for the Ward Leonard Electric Company's Chrome Plating Division.

Mr. Dawson demonstrated the Chromaster industrial chrome-plating units and showed how the large and small manufacturer may do hard chrome plating in his own shop with these new units.

He said that this new method has increased drill life up to 400 per cent, increased file life up to 300 per cent, salvaged dies and plated to precision tolerances. A lively question and answer period followed the discussion.

*—J. E. Riordan*

## Elmira ASTE Members Hear Cornell Professor

Elmira, N. Y.—Guest speaker at the November 3 meeting of the Elmira ASTE chapter was Prof. Earl Brooks, assistant dean of the New York State School of Labor Relations at Cornell University. His topic was "Education in Labor-Management Relations," which was followed by an interesting discussion period.

The technical session and business meeting were held at the Mark Twain Hotel. About 70 members and guests were present.

A three-man nominating committee was named and will include Donald Mosher as chairman. He will be assisted by Henry LeMaire and Arthur Green. Mr. LeMaire was chosen to represent the chapter at the Society's annual meeting to be held in March.

Chairman Raymond Banfield commended Mr. Green, membership chairman, for his work in organizing the current membership drive. The present goal is a total of 100 members.

*—Raymond Banfield*

C. T. Williamsen

## Aluminum Die Casting Topic at Chicago Meeting

Chicago—The November technical session of the Chicago ASTE chapter drew an attendance of more than 200 members and featured a talk on aluminum die casting by F. D. Sanborn of the Aluminum Company of America.

At the business portion of the meeting, the nominating committee for the election of new officers was elected. Members are Art Shaide and Frank Leone, with Dale Long acting as chairman. A report on the October meeting of the ASTE Board of Directors was made by National Director Fred J. Schmitt.

In his talk, Mr. Sanborn described the growth of die casting which began in the 1920's. He compared the cold chamber machines presently in use to the early air injection machines.

A slide of a cover die was shown to explain the gating, cooling and ejecting of the part. Different types of ejectors and a number of methods of side coring holes were shown.

Another program event was the showing of a movie on optical gaging by Mr. Ott of the Eastman Kodak Co.

*—A. L. Winkler*

## Tool and Die Welding Discussed by Williamsen

Philadelphia—An audience of 125 members and guests of the Philadelphia chapter attended the November technical session at the Engineers' Club and heard a talk by C. T. Williamsen, district supervisor, Eutectic Welding Alloys Corp.

He covered many aspects of tool and dies salvage, tool tipping and methods of overlaying tools and dies. Slides were used for illustration and a question and answer period provided opportunity for chapter participation.

Coffee speaker was "Maje" McDonnell of the Philadelphia Phillies who spoke to about 70 persons present for the dinner.

A nominating committee was elected at the short business meeting and is comprised of Frank De Frates, chairman, Arthur Diamond and Charles Lennig. The meeting was conducted by Chairman Al Luecke and First Vice Chairman C. R. Pittsinger.

*—Harry D. Wood*

## Tool Steel Failures Discussed by Harbaugh

Detroit—The Junior Section of Detroit's ASTE chapter met November 20 at the Rackham Building to hear a lecture by John R. Harbaugh, assistant to the vice president in charge of sales, Jessop Steel Co., Washington, Pa. More than 50 young men enrolled in engineering classes at Wilbur Wright School, University of Detroit, Lawrence Technical Institute, Wayne University, and Detroit Institute of Technology.

Mr. Harbaugh spoke on "Tool Steel and Common Tool Steel Failures." He explained the methods of producing tool steel and the control used in the process, giving illustrations of common failures in tool steel.

Consideration when heat treating tool steels was reviewed by the speaker, who also gave a list of the usual causes of soft spots in hardening and cracking in general.

*—Anthony C. Panfil*

**Seated at the speakers' table for the November dinner meeting of the Elmira chapter, from left, were: Arthur Green, membership chairman; Francis Shepherd, secretary; Howard Herrington, treasurer; Ed Bates, first vice chairman; Raymond Banfield, chairman; Prof. Earl Brooks, assistant dean at Cornell University; Robert Snowdon, Eclipse Machine Div.; Mike Buffalin, ticket chairman; and Henry LeMaire, chapter delegate.**

## Klonowski Addresses Mid-Hudson Members

Poughkeepsie, N.Y.—"Pivot Punches, Their Use and Application," was the subject of a talk given to 100 members and guests of the Mid-Hudson chapter by Edmund J. Klonowski of the Pivot Punch and Die Corp., North Tonawanda, N. Y.

Pointing out that the tool engineer is ever alert to new machines and methods to make production more efficient, Mr. Klonowski described the Pivot Punch which was introduced about five years ago. Punch failure, the speaker stated, is due to either misalignment, galling or picking up of the punch, stock growth, uneven stripping, misapplication and vibration.

Mr. Klonowski described in detail how these failures can be overcome through correct design and use of Pivot Punches, using slides for illustration.

Prior to the technical talk, James A. Oxon, president of the Dutchess County chapter of the Society of Professional Engineers, outlined the qualifications for admission to the professional engineering society and described the subjects covered in the New York State examination.

Chapter Chairman Joseph A. Crane announced the appointment of Past Chairman L. H. Tenney as chairman of a committee formed to evaluate the aims of ASTE to ultimately gain state and national professional recognition for the tool engineer. —*S. P. Cook*

## Peterborough Launches Membership Campaign

Peterborough, Ont.—Some 30 night school students joined members of the Peterborough District chapter for the November technical session at the Empress Hotel. The student guests represented classes in tool design and machine technology.

Chapter business included the announcement by Donald Douglas, membership chairman, of a campaign to increase Peterborough membership by at least 50 per cent in the next year.

Technical speaker for the evening was W. Lac Neilson, export manager of the Greenfield Tap & Die Corp., Greenfield, Mass. He gave an educational talk and showed a film on taps and tapping problems. A sales manager of the firm, V. Mitchell, was a guest at the meeting.

At the commencement exercises of the Peterborough Vocational School held November 14, Robert Dyer, chairman of the ASTE chapter, presented a copy of *The Tool Engineers Handbook* to one of the graduates, Collin Ray. —*Don McGillen*

**E. C. Polidor, standing, left, of Optical Gaging Products, Inc., was the program speaker at the November meeting of the Windsor chapter. Shown with him is L. B. Manning, also standing. Seated are Ross Goulin and Chairman David Heath.**

## Optical Projection Topic at Windsor ASTE Meeting

Windsor, Ont.—Nearly 180 members and guests of the Windsor ASTE chapter gathered at the Elmwood Casino for their November technical session, held under the sponsorship of A. C. Wickman Co. The speaker of the evening, introduced by Chapter Chairman David Heath, was Edward C. Polidor of Optical Gaging Products, Inc., Rochester, N. Y.

He presented a movie and slides in conjunction with his talks on new methods of checking production parts by optical projection, incorporating the use of staging fixtures and chart-gages.

At the speakers' table were seated: Joseph Conte, George Dowling, Frank Richi, Harold Chambers, Jack Johnson, Ross Goulin, R. H. Carter, Louis Lowy, and Marvin W. Davis. Mr. Lowy and Mr. Davis represented the Detroit ASTE chapter at the meeting.

—*Marvin W. Davis*

## Tool Steels Discussed at Piedmont Chapter Meeting

Greensboro, N. C.—Piedmont ASTE members met November 10 at Bliss' Restaurant for dinner and a technical program on tool steels. Robert F. Spillet, metallurgical engineer, Crucible Steel Co., Sanderson-Halcomb Works, Syracuse, N. Y., was the program speaker.

His talk covered the fundamentals of tool steel application, choice of type and heat treatment. A lively question and answer period followed the talk.

—*Henry H. Palmer*

## Lehigh Valley Members Hear Kennametal Manager

Allentown, Pa.—An up-to-the-minute talk on methods and procedures for tooling mass production jobs with carbide was presented at the November 21 meeting of the Lehigh Valley chapter. The dinner and technical session were held in the Sky Terrace Room of the Hotel Traylor. About 70 members and guests attended.

The program speaker was Bennett Burgoon, Jr., assistant sales manager of Kennametal, Inc., Latrobe, Pa. His subject was "Latest Developments in Carbide Tooling for Machining Operations." —*John D. Folwell*

## Gavel Presented to New Haven Chapter

New Haven, Conn.—A moment of silence was observed at the November meeting by 90 members of the New Haven chapter for Jerry Kroll, chapter secretary and former editorial chairman who was killed in an automobile accident on November 10. (Ed. note: Mr. Kroll's obituary is published on page 95 of this issue.)

The regular dinner and technical meeting of the chapter was held November 13 at the Hotel Garde. Chairman John Alton announced that a gavel had been presented to the chapter from Arthur Carlson of the Trade School in appreciation of the scholarship aid given each year by the chapter to the Trade School student with the best academic average.

The main speaker of the evening was Malcolm F. Judkins, chief engineer, Carbide Div., Firth Sterling Corp., who lectured on "Method X." His comprehensive address was followed by a general discussion period. Mr. Judkins was introduced by Al Pollard.

—*Silas W. Becroft*

## General Motors Engineer Speaks to ASTE Audience

Springfield, Vt.—A new film on "Ball Bearing Installation and Maintenance" was shown November 12 for members and guests of the Twin States chapter. Dinner for 60 was served before the program at the Trade Winds Cafe.

Charles F. Becher, divisional spindle and service engineer, New Departure Div., General Motors Corp., gave a talk after the movie and conducted a question and answer period.

The film covered the many phases of mounting and the removal of bearings from shafts and housings. It emphasized the necessity for extremely clean working conditions where any repairs are to be made. —*Stacey C. Farrell*

# West Coast News

**By Andrew E. Rylander**

Among recent West Coast developments is a radium-controlled gate for punch presses and other equipment presenting occupational hazards, that automatically stops the machine when the operator's hands get into the danger zone. Its novelty lies in the fact that there is no direct connection between operator and machine. Rather, radium-coated discs, attached to bracelets to be worn on both wrists, activate a Geiger counter which, in turn, relays a "message" to a solenoid switch which, in its turn, stops the machine.

The device, which can be adjusted for distance, is so sensitive that it will function from the infinitesimal emanation of radium from a luminous-dial wrist watch. And that's not "as reported"; I tried it myself. About the only valid criticism of the gadget is its limited life—about 5,000 years.

It is an invention of Mike Simonton, an alert young electronics engineer. So far, activities have been confined to assembly of a few pilot models currently undergoing tests in press shops. However, a company for its manufacture has been organized under the name Hazatrol, Inc. From all indications, the device should have a marked impact on industrial safety.

Also among the "new" on the Coast is a rotary dirt scraper by Miller Manufacturing Company of Selma, Calif. Design incorporates a rotary drum, with attached scrapers, which pick up dirt as the machine travels and deposit it inside the drum coincidentally with grading. When filled, the drum can be emptied at any convenient spot.

With portent of economies in dirt moving even in the comparatively level Mid-West, the machine should be a boon to grading contractors in California and the mountain areas. For here, long stretches of road must be cut through hills and mountains with power shovels, then graded with bulldozers and scrapers. Even homesites must be levelled and graded before dwellings can be erected.

Santa Clara Valley's tool engineers stretched a half program to a full session at the November 18 meeting, held at Longbarn, Palo Alto. Prex Bellamy had been scheduled for half of the program, to speak on industry's relationship with Government. Unfortunately, Mr. Bellamy had to cancel the engagement; however, Capt. Donald L. Irwin, Supervising Inspector Naval Material, San Francisco, doubled in brass—and literally—to round out an excellent program.

Speaking on "Government Relationship with Private Industry," Capt. Irwin brought out how rapid demobilization after the last World War resulted in terrific waste, in many instances unavoidable. However, many tools were saved and these have been "a godsend to the defense program." While some of his remarks may have been off the record—at least, not intended for publication—the following may be of interest as a picture of the near future:

The possibility of a third world war not being immediately apparent, our entry into Korea rather shocked the Kremlin; at least, there has been "no new aggression since Korea." (Here I'm reducing Capt. Irwin's talk to gist, and in my own language with only occasional loose quotes.) Nevertheless, all-out mobilization was found to be necessary, and because modern weapons could not be made in quantity with tools available, Government is going to spend some one-half billion dollars for aircraft tooling alone.

Now, based on a new pattern for mobilization, effort is being directed toward building military and economic strength to stretch over an extended period of time. Government hopes for 120 million tons of ingot steel by 1954. Commenting on small business, Capt. Irwin intimated that 20 percent of prime contracts went to small business.

Presiding at a well-attended meeting was Vincent E. Diehl, chapter chairman, with G. W. "Bud" Hilton, general foreman of small machining at Westinghouse Electric's Sunnyvale plant, in role of program chairman.

Guest speaker at Golden Gate chapter's November meeting, held at Bellini's Restaurant, Oakland, was G. E. Green, motor specialist with General Electric. His subject—"Progressive Mechanization"—was accompanied by a color sound film "Motors in Industry," put out by GE. With frank compliment to both features, it's hard to say which of the two was the more interesting or instructive.

Chairman Ted Rohrer being at Mt. Zion hospital, where he had undergone a rather critical operation, his place as presiding officer was capably filled by 1st V. C. Dave Gustafson. During announcements, Vern Gallichotte commented on his session with the professional engineers at Urbana, reported progress. James Brennan, recently appointed chapter membership chairman, brought out the healthy increase in chapter membership and expressed a belief that the roll would reach, if not top, the 300 mark by the year end. Ted Lindquist, editorial and public relations, gave an enthusiastic account of the chapter roster, now being prepared for publication. Past-Ch'man Al Minetti, recently returned from a trip East, announced greetings from Detroit ASTEers, among them a personal message from Snyder Tool & Engineering's George Whitehouse.

Found myself seated next to Herb Austin, recently transferred from Toledo and now sales representative for Latrobe Steel Company. Latrobe plans a field office in the Bay Area in the near future. During the "social hour" met Kenneth A. Davis, believed to have been the first to establish a tool and die shop in Oakland, and his son Ellwood, a development engineer with Friden Calculator Company.

In Louis Talamini, found an auld acquaintance from "way back when"—that is, once we started putting hairs back on our respective pates. Anyway, we'd worked together at Western Electric, New York, and International Typesetting, Brooklyn, around 1910 to 1912—in the latter plant as tool designers—and so discussed many mutual acquaintances, some of whom are now ASTE members.

**It seems to be a bit of humor at the November meeting of the Golden Gate ASTE chaper. Shown at the head table are: Dave Gustafson presiding in place of Ted Rohrer; G. E. Green, guest speaker; L. Dean Rouland, entertainment and advertising chairman; Jack Moeller, secretary; J. J. Brennan, membership chairman; and Ted Lindquist, editorial chairman.**

## Cincinnati Members Hear Tool Specialist

Cincinnati—About 120 members and guests of the Cincinnati ASTE chapter attended the dinner meeting and technical session held November 11. Dinner, served in the dining rooms of the Engineering Society of Cincinnati, was followed by the showing of a recently completed movie depicting the various Pacific Island battle grounds of the last war as they presently appear.

Technical speaker for the evening's program was H. H. Jason, tool sales specialist with the Carboloy Dept., General Electric Co., Detroit. In his speech on "Deep Hole Drilling and Trepanning," Mr. Jason explained the uses of carbide tools in these two types of machining as they are currently being applied to steel forgings and billets in the manufacture of rifle barrels.

Most tool engineers are familiar with trepanning in surgery and sheet metal work but its application to producing long holes through steel with a tremendous saving in time is unique, said Mr. Jason. Slides were used to illustrate the speech.—*Louis H. Schumann*

## Cumming Gives "Uses Unlimited"

Portland, Me.—A program on "Uses Unlimited" was presented by Kenneth J. Cumming, sales engineer, Micro-Switch Div., Minneapolis Honeywell Co., Freeport, Ill., at the November meeting of the Portland ASTE chapter. He was assisted by H. E. Ritchie of the same company.

After giving a brief history of the Micro-Switch, Mr. Cumming narrated a film which showed the many uses for the various types of switches his company manufactures.

A stimulating question and answer period concluded the session. Dinner for the chapter was served before the program got under way. Thirty members and guests attended the meeting.
—*Clifford B. Smith*

## Harry Stewart Speaks to Salt Lake City Chapter

Salt Lake City—Technical speaker at the October 17 meeting of the Salt Lake City ASTE chapter was Harry L. Stewart of the Logansport Machine Co., Logansport, Ind. About 30 members and guests were present.

He discussed practical pneumatic and hydraulic applications for the tool engineer. The lecture included slides showing cylinders and equipment installed on various machine tools and allied machinery. —*Leo P. Fedigan*

# *Coming* MEETINGS

CHICAGO—Jan. 1, Keymen's Club. "Vibrations, Deflections and Thermal Distortions in Machine Tools" by Dr. Max Kronenberg, Cincinnati Milling Machine Co., Cincinnati.

CLEVELAND—Jan. 9, Carter Hotel. Past Chairmen's Night. "Low Temperatures and the Problems Presented in the Use of Diesel Engines" by Mark Resek, vice president, Perfection Stove Co., Cleveland.

DETROIT—Carbide Section: Jan. 8, panel on "Machining with Carbides." Senior Section: Jan. 15, Father, Son and Daughter Night. Educational Section: Jan. 22, "Forging Die Design."

KEYSTONE—Jan. 8. "Progress in Diamond Grinding Wheels" by H. A. Snow, Bay State Abrasive Products Co., Westboro, Mass.

FAIRFIELD COUNTY—Jan. 7, Hitching Post Inn. "Jig Boring and Related Problems" by F. O. Hoagland, master mechanic, Pratt & Whitney.

FT. WAYNE—Feb. 11, 6:30 p. m., Chamber of Commerce. Election and tenth anniversary meeting.

GRAND RIVER VALLEY—Jan. 9. Program on automatic transfer pressworking presented by a representative of Verson Allsteel Press Co., Chicago.

GREATER NEW YORK—Jan. 5, 8 p. m., New York Times Bldg. "Fine Pitch Gearing" by A. R. Fultz, chief tool engineer, Hawkeye Div., Eastman Kodak Co., Rochester, N .Y.

HARTFORD—Jan. 12, 6:15 p. m., City Club. "Precision Grinding" by J. Meehan, sales director, Grinding Machine Div., Brown & Sharpe, Providence, R. I. Feb. 2, 6:15 p. m., Windsor Locks. Dinner and plant tour, Hamilton Standard Div., United Aircraft Co.

LEHIGH VALLEY—Jan. 16, 6 p. m., Hotel Traylor, Allentown. "Making Tool Steel at Latrobe" by Stewart G. Fedchi, sales engineer, Latrobe Steel Co., Latrobe, Pa.

LITTLE RHODY—Jan. 8. "Antifriction Bearings and Their Use in Machine Tools" by S. Nielson, assistant chief engineer, SKF Industries, Inc. Feb. 5. "Principles of Locating" by J. I. Karash, tool engineer, Reliance Electric & Engineering Co.

LONG ISLAND—Jan. 12, 8:30 p. m., Garden City Hotel. "Human Relations and Industry" by John Mason of King Features Syndicate.

LOS ANGELES—Jan. 8, 7:30 p. m., Scully's Cafe. "Aerojet Rockets" by Thorpe Walker, project engineer, Aerojet Engineering Co., Azusa, Calif.

MILWAUKEE—Jan. 17, Elks Club. Annual dinner dance.

MONTREAL—Jan. 8, 7:45 p. m., Montreal Technical School. Program on mechanical power presses presented by representative of Danly Machine Specialties, Ltd.

NORTHERN NEW JERSEY—Jan. 13. "Pivot Punches, Their Use and Application" by Edmund J. Klonowski, Pivot Punch and Die Corp.

NEW ORLEANS—Jan. 14. Program on carbide tools presented by P. S. Schover, Wesson Co.

PIEDMONT—Jan. 12, 6:30 p. m., Charlotte. "Optical Comparators" by H. L. Murch, chief optical engineer, Jones & Lamson Machine Co., Springfield, Vt.

PEORIA—Jan. 17, 7 p. m., main ballroom and La Salle room, Hotel Pere Marquette. Annual Ladies' Night and dinner dance.

PETERBOROUGH—Jan. 8, 6:30 p. m., Empress Hotel. Program by A. C. Wickman, Wickman of Canada, Ltd.

PITTSBURGH—Jan. 9, 6:30 p. m. Sheraton Hotel. "Methods Engineering and Management" by W. E. Eargle, Westinghouse Electric Corp. Feb. 6, 6:30 p. m., Sheraton Hotel. "Materials Handling" by L. J. Johnson, Mathews Conveyor Co.

PORTLAND (ME.)—Jan. 9, 7 p. m., Greymore Hotel. "Production Miracles Through Controlled Air Power" by Harold W. Lamb, Bellows Co., Akron, O.

POTOMAC—Jan. 8, 6:30 p. m., Hamilton Hotel. "Time and Motion Economy" by Dr. Derson Shybekay, New York, N. Y.

SANTA CLARA VALLEY—Jan. 20, 7 p. m., Red Coach Inn. "Latest Methods of Fabrication of Deep Drawing Dies" by Stanley R. Cope, president Acme School of Die Design, South Bend, Ind.

TRI-CITIES—Jan. 14, 6:30 p. m., Rock Island Arsenal. "Gaging and Quality Control" by Mr. Pearne, DoAll Co., Des Plaines, Ill.

TWIN CITIES—Jan. 7, Covered Wagon. "Machineability and Tool Design" by C. J. Oxford, chief engineer, National Twist Drill and Tool Co., Rochester, Mich.

TWIN STATES—Jan. 14, Trade Winds Cafe, Springfield. "Plastics as Substitutes for Metals" by George B. Parsons, Parsons Aircraft Engineering Co.

WILLIAMSPORT—Jan. 12, 8 p. m., tour of the armored tank manufacturing facilities of the Berwick Plant, American Car & Foundry Co.

# News in Metalworking . . .

## RELIEF SIGN IN ALUMINUM FIELD

Manufacturers may look forward to a quick easing of the aluminum situation as a result of a recent agreement between our government, Britain and the Aluminum Company of Canada.

According to Samuel W. Anderson, deputy administrator for aluminum in the Defense Production Administration, the British Government and the Aluminum Co. of Canada have agreed to supply a United States request for 77,000,000 pounds of aluminum during December, 1952, and the first two quarters of 1953. The request was made by the United States Government because of the serious loss of aluminum production caused by power shortages in the Pacific northwest and Tennessee Valley.

These shipments will result from an additional diversion during December, 1952, and the first quarter of 1953 of 44,000,000 pounds under contract for shipment to the United Kingdom, together with 33,000,000 pounds which was to be returned to the United Kingdom under the terms of similar arrangements made in 1951 and early in 1952. The 33,000,000 pounds mentioned in that agreement form part of the 55,000,000 pounds of Canadian aluminum the British Government diverted to the United States. This, together with the diversion of 44,000,000 pounds, makes a total of 99,000,000 pounds, of which 22,000,000 pounds is to be returned to the United Kingdom under a revised schedule during the second quarter of 1953. The balance is to be deferred into 1954 and 1955, although this schedule would be accelerated if a situation should arise which would require substantial increases in British aluminum needs for defense, or should their supplies be substantially reduced by events over which they have no control. The quantity of aluminum received by this country as a result of the agreement will be in addition to the metal the Aluminum Co. of Canada already has allocated to the United States market.

For the fourth quarter of 1952, expected shipments from that company will now total 80,000,000 pounds, while the first quarter of 1953, they are expected to be about 85,000,000 pounds. However, all the Canadian metal will be sold in this country in accordance with distribution controls set up by the National Production Authority.

Mr. Anderson, although noting that the assistance will substantially help relieve the difficulty now being experienced by industrial users, cautioned against assuming that any aluminum beyond that currently authorized for manufacturing would be provided and pointed out that the additional alumition of a large backlog of unfilled ornum will assist in avoiding accumuladers.

At the same time news was released concerned additional aluminum supply, the Defense Production Administration announced an expansion goal for aluminum sheet and for heat treating facilities for aluminum sheet and plate. Capacity for an additional annual 684,000,000 pounds by January 1, 1955, is the aim of the first part of this goal. In other words, expansion will increase aluminum sheet, plate and foil capacity from 1,908,000 pounds in 1950 to 2,592,000,000 pounds in 1955.

Second part of the goal is to provide capacity for heat treating an additional 846,000,000 pounds annually of aluminum sheet and plate. This expansion is designed to increase aluminum sheet and plate heat treating capacity from 702,000,000 to 1,548,000,000 pounds in that same five-year period.

At the time of the announcement,


FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-100

...ut 50 percent of the goal announced ...l been covered by issuance of certifi...es of necessity.

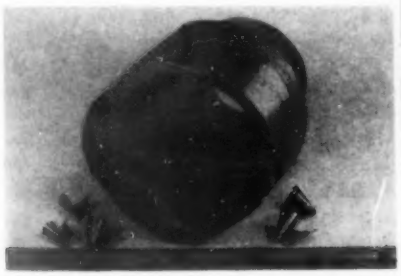
Government assistance under this ...t, according to DPA, will be re...icted to facilities meeting the fol...wing criteria: (1) New facilities ...pable of producing sheet and plate ...8 inches or wider; (2) New sheet ...d plate mills which include heat ...eating facilities capable of processing ...minimum of 50 percent of finished ...apacity; (3) New sheet and plate ...ills designed so that heat treating ...apacity to process the total finished production capacity can be installed with a minimum of difficulty, expense or disruption of existing production.

## TIME-CUTTING METHOD SPEEDS UP DRILLING

Experience reported by Kennametal has indicated an easier, faster method of drilling holes through long metal pieces than by former common practice.

The operation involved drilling three-inch diameter holes through 30-foot long chrome-nickel-molybenum (Brinell 260-320) drill collars. Until recently high-speed spade drills were used, and twelve to fourteen hours plus three or four tool changes were required for the job. By using a cemented tungsten carbide, triple edge, off-center drill head the operation took less than two hours actual machining time.

One of the keys to the method is the 3-inch drill head whose cutting edge consists of three stepped tips. These



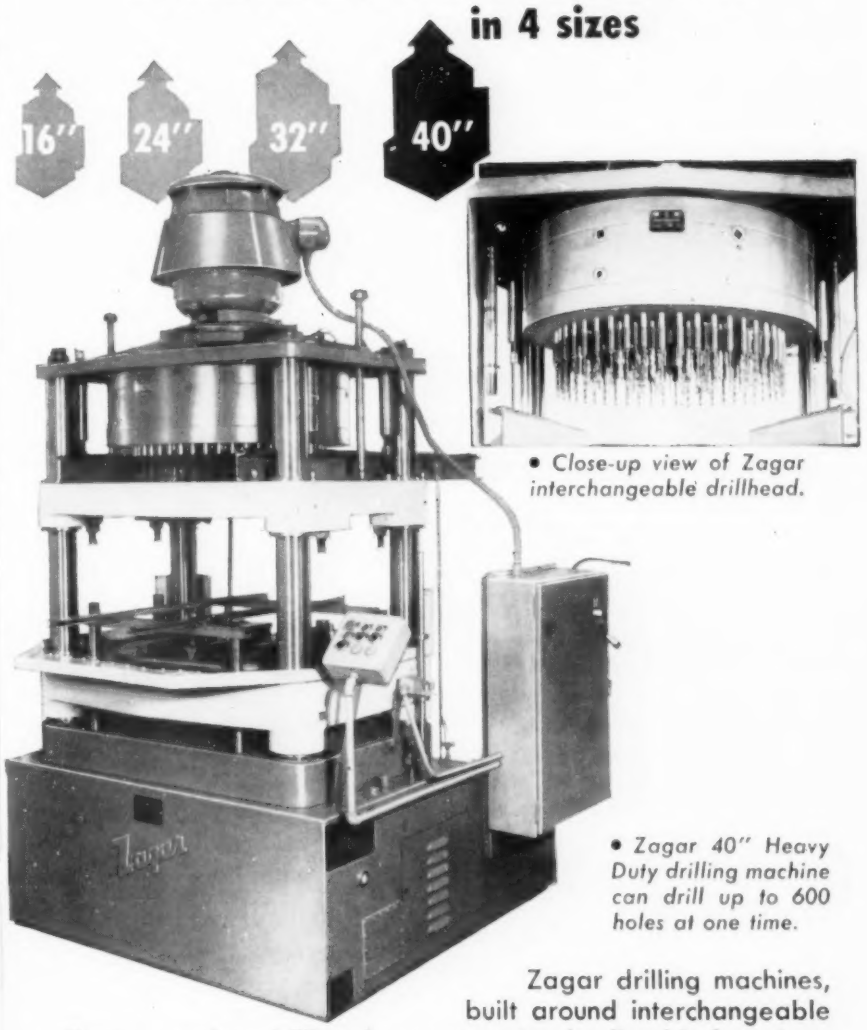
divide chips into three sections while a chipbreaker on each tip curls and breaks up the chip sections for easy disposal. Point of the drill is 0.170-inch off-center, preventing buildup as it makes a circular forming cut. Wear pads on the side of the drillhead guide it on its entire journey and these, plus the self-centering action of the cutting edges assure a straight and true bore. About 0.010-inch clearance exists between the wear pad diameter and cutting diameter.

The collar is drilled halfway through the 30-foot length at 450 rpm with a 0.008-inch feed. The boring bar re-


NEW Zagar HEAVY DUTY

40" DRILLING MACHINE

Successful line is now standardized in 4 sizes




• Close-up view of Zagar interchangeable drillhead.

• Zagar 40" Heavy Duty drilling machine can drill up to 600 holes at one time.

Zagar drilling machines, built around interchangeable Zagar gearless drillheads, are now standardized in four sizes. The new heavy duty 40" machine lifts the scope of the line to such jobs as turbo-jet engine frames. Yet simplicity of design enables set-ups to be made or changed over in a few hours. You get greater horsepower, thrust, and rigidity and better alignment than in conventional drill presses. Greatly broadened, therefore, is Zagar's facility for drilling any number of holes at one pass, in any pattern on centers as close as twice drill diameter.

ZAGAR TOOL, INC.

24000 Lakeland Blvd. • Cleveland 23, Ohio

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

Get Engineering Manual E-1 for more information on all Zagar's tools for industry.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-101

# How to BOOST OUTPUT of OLD Screw Machines

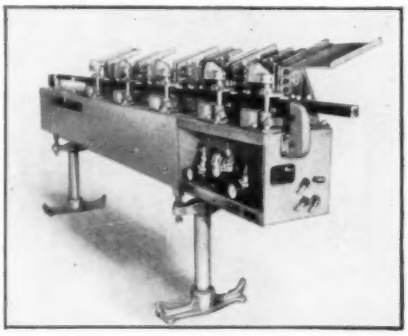
## Lipe Automatic Magazine-Loading Bar Feeds boost output 30% and more on 15 to 30-year old B&S's!

This battery of 25-year old screw machines received a production "shot in the arm" when equipped with Lipe AML Bar Feeds.

Lipe's AML Bar Feed greatly speeds-up stock feeding. Enables a screw machine to produce 90% or more of its gross geared production capacity. Increases output at least 30%—in many instances better than 100%!

### Makes feed fingers obsolete

Lipe's AML Bar Feed is actuated by a pneumatic control system of valves and cylinders. Stock is fed through the collet by a pusher rod at the *end* of the bar. There is no other point of contact. This method of feeding does away with feed fingers . . . abolishes multiple feed finger feedouts . . . eliminates scratching and marring of high-finish stock . . . reduces scrap and rejects.



Lipe AML Bar Feeds help overcome new equipment shortages . . . cut cycle time, increase actual gross of older machines.

### Load it . . . forget it

Magazine holds a normal 8-hour day run of stock. Capacity ranges from 19—5/8" to 96—1/8" bars. Loading and feeding are automatic. Stock is fed continuously . . . there's no idle operation—no "cutting air." Operators are relieved of repetitious stock bar handling . . . can attend a greater number of machines.

**MODEL AML BAR FEEDS AVAILABLE FOR...**

B&S No. 00 Spindle Bore 9/16"
B&S No. 00 Spindle Bore 11/16"
B&S No. 0 Spindle Bore 7/8"
B&S No. 0 Spindle Bore 1"

Other Lipe Pneumatic Bar Feeds available for other screw machines, automatic or hand, handling from 1/8" to 2 1/2" diameters.

Convert your old screw machines into modern, high-production equipment . . . economically! Let our engineers show you how. No obligation. Write

**Lipe-Rollway Corporation, Syracuse 1, N.Y.**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-102


volves at 10 rpm in the opposite direction from the workpiece. This 15-foot penetration requires about an hour. The workpiece then is reversed and drilled from the other end after a freshly ground head is mounted. The two 15-foot holes match in the center to within 1/64 of an inch.

A Niles boring lathe converted to high-speed operation by installation of roller bearings in the spindle was used for the operation. It was driven directly with a 50-hp d-c motor. A speed control rheostat permitted infinite adjustment to avoid all chatter.

From a vantage point in his seat on the side of the carriage as it feeds the bar into the workpiece, the operator can tell quickly the condition of the drill's cutting edges by color and shape of the chips being produced. At the same time he can keep a constant check on the power indicated on a wattmeter mounted directly in front of him. Soluble oil is pumped in around the outside diameter of the hollow drill bar at 90 psi and washes chips back through the boring bar.

## COMPANY FORUMS PROVE SUCCESSFUL

Food Machinery & Chemical Corp. has celebrated completion of a year's program which might provide a pattern for other companies interested in lecture-discussion meetings.

The programs, under the direction of Alan G. Dimond, a member of ASTE's Santa Clara Valley chapter, consist of monthly educational forums, planned with a co-sponsoring company, to which top men from specialized fields are invited to speak. Usually films or slides clarify the narration, and a question and answer period following the lecture allows further pursuit of particular points.

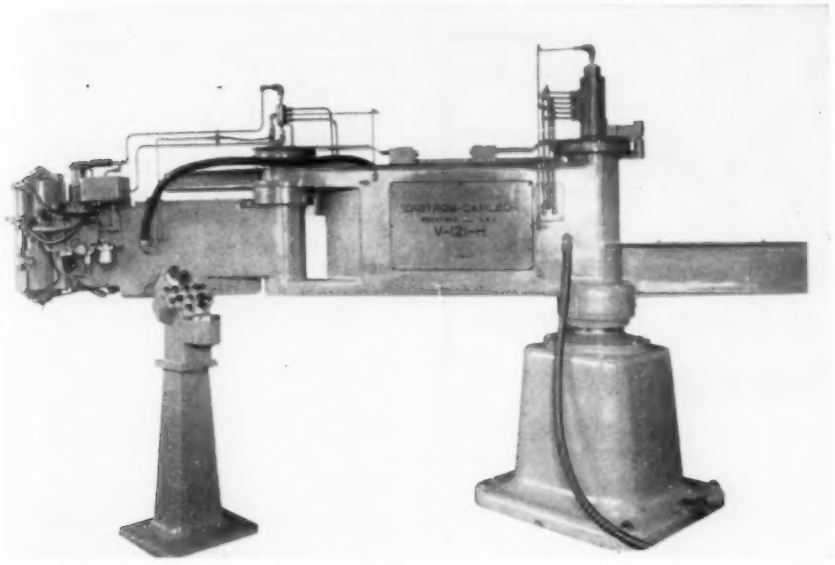
The technical forums, at Food Machinery contact, company personnel often gain a new view of their problems, and of course the company benefits as a consequence. In fact the program has indirectly provided a central clearing house for a discussion of problems arising from production and design.

As an example of the type of program offered, a metallurgist was invited to speak on "The Making of Steel" at a forum which was co-sponsored by Joseph Ryerson & Son; a forge design engineer talked on "Aluminum Forging Design" with Vernon Forge Works as co-sponsor; and a metallurgist discussed "Aluminum in Industry" with Aluminum Co. of America cooperating.

## EGLINTON CARBIDE MOVES

Mr. George Eglinton has announced that his company, Eglinton Carbide Products Inc., has been moved from Lincoln Park, Mich., to 333 Cedar St., Wyandotte, Mich.

# Tools of Today . . . .



## Radial Arm Router

This machine is said to represent the latest development and advancement in the field of high speed routing and certain types of milling operations in nonferrous metals.

All manual effort, except for the simple operation of pushing control buttons, has been eliminated and what was previously a tedious slow job has been converted to a machine tool operation. Production is increased, quality is improved and the costly element of fatigue and employee separation is nullified.

The machine consists of a base, main turret, two hydraulic power-operated arm sections, a router head, a remote control station, the complete hydraulic panel and the electrical panel. The router head operates on high cycle current. The source of the high cycle current is not an integral part of the machine.

The base is cast semisteel, heavily ribbed with ample floor bearing area.

The inner and outer arm sections are box-type design and are made of cast semisteel. These arms operate in Timken tapered roller bearings with provision for take up. Feeding power is applied to each of these two arm sections by means of a hydraulic cylinder, rack and pinion. The two arm sections are equipped with magnetic electric brakes.

As standard, the machine is equipped with a single-winding 30-hp air-cooled motor for operation on three-phase, 440-volt, 240-cycle current to provide a spindle speed of 14,400 rpm. The head is equipped with a draw bar type collet having a maximum capacity of ¾-inch diameter straight shanks.

As standard, the head is equipped with a removable cast member to receive the replaceable non-rotating pattern followers. The pattern follower is so designed that the cutter coolant is directed to the cutter as a mist, completely enveloping the cutter for maximum efficiency. The standard set back or offset between the template or router block and the edge of the material when cutting is $\frac{7}{32}$ inch.

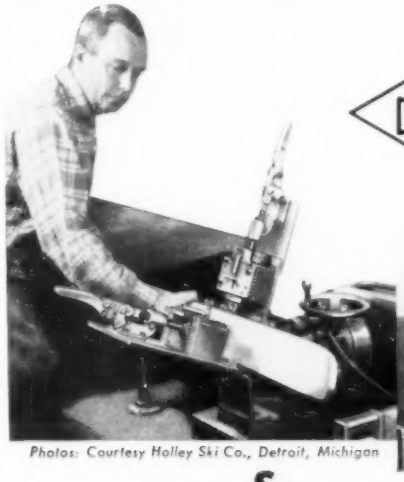
All controls for the machine are located on a remote control station. For further information, write to the Ekstrom Carlson Co., 1400 Railroad Ave., Rockford, Ill. **T-1-1031**

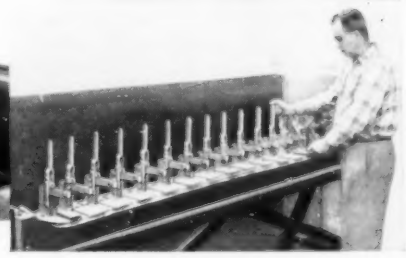
## Chucks

Large turbine wheels and jet-engine discs and rings can now be machined without fear of distortion or strain when held in the chucks engineered and designed by the Cushman Chuck Co., Hartford, Conn.

These chucks meet the requirements of rigidly holding large workpieces of small cross-section without the usual distortion strain or harmonic vibrations encountered when machined at high speeds. These chucks can be furnished on special order for either manual chucking or air-power chucking for repetitive machining operation.

**T-1-1032**



Photos: Courtesy Holley Ski Co., Detroit, Michigan

DESTACO **HOLDS THE EDGE**

Skiers know proper edging is most important for smooth slalom maneuvers. In production, precision tooling is necessary to obtain quality products. In the manufacturing of Plasti-Glass Skis the Holley Ski Company use De-Sta-Co's Model 620 Plunger Clamps to provide proper pressure during the slotting of the skis at a 22½ degree angle to allow for a patented moulded edge. Fifteen De-Sta-Co Model 110-C Toggle Clamps with Pressure-Matic adapters provide the necessary holding force to the welded angle plates which hold the ski in place during the cementing of the spring steel edges. Completely retractable the clamps allow easy insertion and removal of the skis from the drying fixture.

There's a De-Sta-Co Toggle Clamp engineered for your work-holding problems in assembly, welding, bonding, machining or inspection. Select from over 40 fixture and portable models. Positive holding pressures up to 4000 pounds. Write today for a copy of the De-Sta-Co catalog describing available stationary and portable toggle clamps.

DESTACO **DETROIT STAMPING COMPANY**

328 Midland Ave. • Detroit 3, Mich.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-103

NOW!

Erickson
Self-Releasing
Tap Holder

## Tap to Closer Tolerances at High Production Speeds...

With this member of the famous family of Erickson Precision Holding Tools, you can now produce any class fit at truly record breaking rates.

Review your present tapping operations. Learn how they can be improved by the Erickson Tap Holder's special features:

1. **Self-Releasing:** Positive, simplified releasing mechanism speeds production, prevents tap abuse.
2. **Corrects Misalignment:** Adjustable to correct spindle errors; extends useful life of machine.
3. **Positive Drive:** No interference with alignment. Same principle as used in Erickson's famous Tap Chucks.
4. **Full Grip:** Erickson collet grips along its entire length.
5. **Maximum Tool Life:** Corrected alignment assures even cutting on all flutes; cleaner threads; longer tap life.
6. **Increased Speeds:** Superior alignment and control of cutting operation safely permit stepped-up speeds.

### Write for catalog today—

A-6415

**CATALOG A**
*Precision Collet Chucks*

**CATALOG B**
*Adjustable and Full Floating Holders*

**CATALOG C**
*Precision Tap Chucks*

**CATALOG D**
*Air-Operated Speed Chucks and Air Cylinders*

**CATALOG E**
*Precision Expanding Mandrels*

**CATALOG F**
*Speed Indexers*

**CATALOG G**
*Boring and Reaming Tools*


**ERICKSON TOOL COMPANY**
2316 K HAMILTON AVE. • CLEVELAND, OHIO

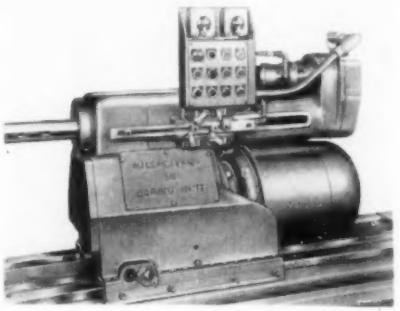
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-104

## Automatic Boring Uni

The Millholland No. 3B boring un is basically a fixed center horizontal b ing mill with automatic cycle. The o tor is 5 to 10 hp and the spindle spe is 33 to 500 rpm by pick off gears.

The diameter of the spindle is 3 inches and has a No. 5 Morse taper. The length of the bar stroke is 10 inches.

The boring unit body is a box-ribbed semisteel casting. The hardened high alloy steel spindle reciprocates through hardened steel bushings mounted in the sleeve. The sleeve is contained at the forward end in two precision Timken bearings and the rear mounted third bearing is permitted to float. The spindle reduction drive is full ball bearing mounted with ample gear tooth design to give a large factor of safety and the final drive is through helical gears.



The feed mechanism is operated by means of a hydraulic pump and fluid motor. The fluid motor drives through a gear reduction to the lead screw which in turn feeds the lead nut mounted in ball bearings on the end of the spindle.

A system of valves and piping will allow cycle adjustments within the range specified. The pump is a two pressure system incorporating an automatic unloading valve, and is mounted on a tank apart from the machine. The fluid motor is a multiple piston rotary type of constant displacement.

Lubrication of spindle reduction and bearings is maintained from a pressure system operating in a reservoir in the main casting. Other points are lubricated through Alemite fittings.

Changes of feed during the automatic cycle are controlled by means of adjustable dogs contacting limit switches. However, the positive stop switch need only be adjusted within ¼ inch of accuracy because this contact actuates a solenoid which in turn permits a rotary stop mounted on the lead screw to function. The rotary positive stop is adjustable in approximately 0.001-inch increments.

Made by W. K. Millholland Machinery Co., 6402 Westfield Blvd., Indianapolis 20. **T-1-1041**

## Materials Handler

The Fried Stripveyor automatically lifts up cut strips beyond the shear blade and transforms manual handling of sheet into a wholly mechanical operation, thereby promoting safety in addition to cutting costs. The apparatus is adjustable to any height up to 45 inches, is synchronous to shear speed, can handle any gage sheet metal up to $\frac{3}{8}$ inch and widths as wide as allowable by a standard 24-inch back gage. It is portable and comes built on swivel caster supported carriage supplied with floor locks.

The Liftveyor enables clean-cut wide shearing to 0.005 inch regardless of material, by elimination of flexing. It supports the sheet with air operated plungers while the sheet edge is against the back gage. It then conveys sheet beyond the shear frame. Two models are currently in production: standard, for sheet to $\frac{1}{8}$-inch thickness; and heavy duty for plate to $\frac{1}{2}$-inch thickness.

Further information may be obtained by writing to Fried Steel Equipment Mfg. Corp., 528 East 119th St., New York.

**T-1-1051**

## Pocket Hardness Tester

Pacific Transducer Corp., 11921 West Pico Blvd., Los Angeles 64, offers a low cost portable pocket hardness tester for determining the hardness of steel alloys and other metals in the range of from 25 to 65 Rockwell C scale.

The test set features portability. It can be carried in the pocket on the job. It may be used to test specimens of steel alloy in almost any place or position. It is a direct reading device. No further calculations are required. This makes the unit particularly fast in operation.

The test includes a microball indentor, a measuring microscope and a standard hardness test block. It operates by means of an impact indentor which drives a $\frac{1}{16}$-inch tungsten carbide ball a short distance into the sample to be tested. The diameter of the indentation is then measured by the reticulated microscope. As the diameter is a function of the hardness, the reticle indicates the hardness directly. It is accurate to $\pm 1\frac{1}{2}$ points, C scale.

It lends itself particularly to use by field engineers, maintenance engineers, sales engineers and plant engineers. It is adapted for testing all parts of large dies, punches and large welds as well as for structural steel, tanks and large pipes in position where only a portable hand tester of this type can be used.

**T-1-1052**

## Belt Sander

Designed for fine burring, grinding and polishing operations on metals, rubber-plastics, glass and similar materials, the Benchmaster belt sander offers several advantages.

The large 4-inch diameter belt wheels are mounted on heavy duty, wide, double-row double-sealed ball bearings which are both liquid and dust-proof. At average working loads, bearing life is estimated in excess of 10,000 hours.


A trackage adjustment insures positive wheel alignment. The top wheel supporting arm is rocker-mounted as well as pivoted for belt take-up. A spring load insures correct belt tension when using the back-up plate. No auxiliary belt trackage devices are required. The pivoted back-up unit retains its parallelism with the belt at any angular setting of the table.

The belt sander requires only $1\frac{1}{4}$-hp, 1750-rpm motor and is driven with a V-belt. It is designed to operate at any speed up to 8000 sfm, more than ample even for high-speed steel applications. Any standard belt width from $\frac{1}{4}$ to 1 inch by 44 in. length is accommodated. Information is available from Benchmaster Mfg. Co., Gardena, Calif.

**T-1-1053**


**WHY is it 4-to-1* for IDEAL Live Centers?**

*Named "Leading Brand" 4-to-1 over any other in a nation-wide survey of industrial distributors.


**for BIG or LITTLE TURNING JOBS**

THE answer to this over-whelming preference lies in the way IDEAL Live Centers are built . . . in their micrometer accuracy and their bulldozer durability. Their unique construction makes them practically vibration-free and deflection-free. Short overhang and precision-type bearings insure the utmost rigidity in turning. All parts are hardened and precision ground. Special seals keep out chips, coolant and other foreign matter. It's this *built-in* performance that makes them a 4-to-1 favorite.

**Multi-Duty Models with Male, Female or Pipe Points; Heavy-Duty Models, accurate to .0005" for jobs up to 18,000 lbs. *For any job, you can't buy better!***

*Sold Through America's Leading Distributors*

GET FREE CATALOG DATA

IDEAL INDUSTRIES, Inc.
4152 Park Avenue
Sycamore, Illinois

Please send me catalog data on IDEAL Live Centers and OTHER PRODUCTION SPEED-UPS AS INDICATED:

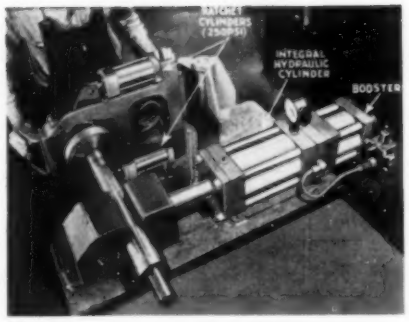
☐ Electric Etchers ☐ Tachometers
☐ Electric Markers ☐ Demagnetizers

Name_____
Company_____
Address_____
City_____ Zone____ State____

INDICATE A-1-105

## Bench Type Clamp

Holding polished chrome-plated piston rods tight at over 15 tons of clamping pressure to permit assembly of piston and followers . . . the rod is the job performed by this unique clamping device designed and built by Planet Products Corp., of Cincinnati in conjunction with Miller Motor Co. A hydraulic pump operating at 250 psi powers the entire device. The 15 tons clamping pressure is obtained by use of a standard 5-inch bore fluid pressure booster with a booster ratio of 6.25 to 1 driving a 5-inch bore high pressure hydraulic cylinder, the piston rod of which operates the movable clamping member. The booster and cylinder are assembled integrally as a single compact unit with no high pressure piping used between them. Brass V jaws on the clamp




prevent marring of the polished rod finish under the tremendous clamping pressure developed.

A feature of the device is the tightening adapter for the piston and follower assembly. This adapter is hinged to swing away from or toward the clamped rod and contains a circular tightening disc that turns clockwise or counterclockwise as desired by ratchet action of two small-bore hydraulic cylinders operating at the 250 psi pump pressure, one mounted at top, the other at bottom of the tightening adapter. Into the face of this disc are spaced holes for receiving steel pins that protrude at right angles to the disc face and lock into tightening holes in the piston follower. With the rod held tightly by the clamp, the piston-follower assembly is placed on the rod lightly by hand; the tightening adapter is then swung into position with the pins in the revolving disc holes locking into aligning holes in the last follower and the entire assembly tightened merely by flicking the switch operating the cylinders. If disassembly is required, the switch is flicked to reverse position, thus loosening the follower holding the assembly together. For further information write Miller Motor Co., 2040 N. Hawthorne Ave., Melrose Park, Ill.

**T-1-1061**

## Temperature Check

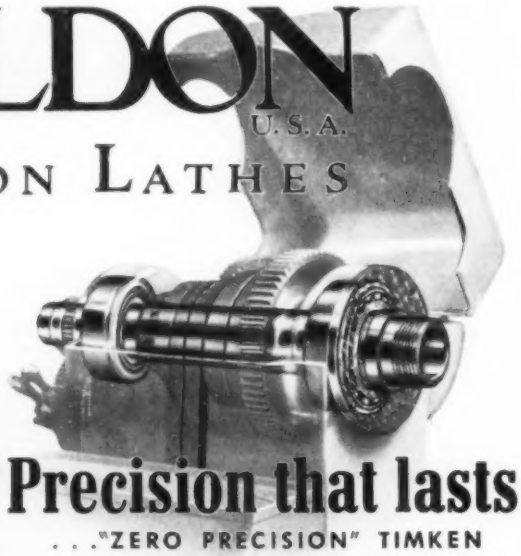
Variables in temperature often cause controversy in close tolerance measurement and can easily be avoided by measuring temperatures of either the gage blocks or work or both. Webber Temp-Check solves this difficulty by providing a fairly fast method of reading temperature of metals, liquids, or air within the range of the instrument.

The standard model is calibrated from 60 to 100 deg. F. The reading is obtained by placing the probe on the object to be measured. Within minutes the actual temperature of the piece will be shown on the dial.

Webber Temp-Check is completely portable and about as large as a snapshot camera. Dial readings can be checked on the spot and calibrated by turning an adjustment screw. Two flashlight batteries supply the current. Webber Gage Co., Cleveland, is the maker.

**T-1-1062**

SHELDON
CHICAGO U.S.A.
PRECISION LATHES



SHELDON
"Stamina" Features:

- Rigid, Heavily cross-strutted 1-piece Beds—2 V-ways, 2 Flat ways
- Full Double-Walled Aprons—all gear shafts supported on both ends.
- Heavy Carriage with wide bearing on bed.
- Twin V-Belts to Spindle for extra power.

Precision that lasts

. . ."ZERO PRECISION" TIMKEN TAPER ROLLER BEARINGS

No lathe can be more accurate than its spindle bearings. Hence before buying any lathe one should check the *exact* type and tolerances of bearings used.

The No. TS-56B (and several other) SHELDON Precision Lathes have Timken "Zero Precision" Taper Roller Bearings, held to tolerances of .00015". Not only are these the most accurate bearings used in any lathe, they are the sturdiest type . . . hold their accuracy thru long hard use . . . hold it even under abuse. With the other stamina features built into SHELDON Precision Lathes, they assure continued accuracy, without costly maintenance, thru years of hard service.

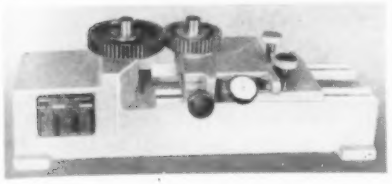
*Write for Catalog*

SHELDON MACHINE CO., INC.
4229 N. Knox Ave., Chicago 41, Illinois

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-106

## Gear Rolling Fixture

A model 602 bench-type rolling fixture for checking size, eccentricity and roll smoothness of spur and helical external gears is announced by Michigan Tool Co., 7171 East McNichols Road, Detroit 12. The fixture features a heavy cast iron base, scraped ways and hardened and ground ball ways. It can be used in conjunction with the Michigan model MTR-50 automatic recorder to place all readings on permanent charts.



The gear to be checked is loaded on a vertical arbor that is moved into mesh with the master gear by an eccentric lever control. Proper tension between gear and master gear is maintained by spring-loaded ball ways. Turning the gear manually causes a 0.0005-inch indicator to show size, eccentricity and smoothness variations.

The model 602 rolling fixture has a center distance adjustable from 2 to 10 inches. The master gear arbor is 1-inch OD. Arbors for gears to be checked are made to suit. The fixture is 9½ inches wide, 29 inches long and 7¼ inches high. **T-1-1071**

## Blower

A high-pressure blower that quickly removes fumes, smoke, dust, sawdust and obnoxious odors is being offered by Standard Electric Mfg. Co., Inc., West Berlin 12, N. J. The precision-made, all-aluminum, high quality blower moves

up to 450 cubic feet of air per minute. On the standard unit, made with 5½-inch inlet and 3½-inch outlet, power is supplied by an enclosed, ⅙-hp Westinghouse, 115-volt, single-phase a-c, 3450-rpm motor. However, larger sizes with different speeds and different current characteristics can be obtained. **T-1-1072**


IF THIS IS YOUR PROBLEM

TRACER TURNING TOUGH ON TOOLS?

*These tools will solve it!*

Tracer turning has this great advantage—higher production rates can be attained, using far less skilled operators' time than is required for the conventional "cut and try" procedure.

But—any tracer lathe is only as good as the cutting tool it drives. The burden on the tool is great. It must have ruggedness for heavy stock removal and a long-lasting cutting edge able to maintain accurate duplication throughout the complete machining cycle.

Kennametal pioneered this field—has developed carbide tooling for light and heavy tracer lathe jobs, including roll profiling. With this tooling, tracer turning has reduced machining time as much as 80%*.

Our engineers will cooperate with you—give you the benefit of their industry-wide experience—develop the most suitable Kennametal tooling for your tracer operation. Write, telling us your problem. Kennametal, Inc., Latrobe, Pa.

*Performance studies will be sent upon request.


KENNAMETAL

CEMENTED CARBIDE TOOLING THAT INCREASES PRODUCTIVITY

®

HEAVIER CUTS IN HARDER MATERIALS AT HIGHER SPEEDS

# Get More Production with GORHAM "M-40-B" Tool Bits!

Get more out of your machine tools . . . raise your production curve . . . with Gorham "M-40-B" turning tools! Use "M-40-B" wherever the application of a Super High Speed Steel is indicated, as in machining heat treated alloy steels with large amounts of stock removal at high surface speeds.

"M-40-B" is a Super Moly grade with performance characteristics comparable to those of super tungsten high speed steel. It has extremely high red hardness, high Rockwell hardness, and offers maximum toughness and abrasion resistance. You can take heavy roughing cuts with it at high surface speeds and feeds . . . use it for high speed finish cuts as well.

"M-40-B" comes in square tool bits, 11 stock sizes, and in 23 stock sizes of rectangular turning tools. Bits and turning tools are accurately ground, uniformly hardened, ready to sharpen. Special sizes and shapes to your order. Illustrated with prices are three popular size "M-40-B" tool bits. See your distributor, or send direct for a trial order.

"M-40-B" is one of three cutting tool materials developed by Gorham. Others are Gorham "Standard", for the commercial field, and "Gormet", for turning soft or abrasive stock. They're completely described, with size and price lists, in a new free bulletin. Send for your copy today.


Gorham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

14407 WOODROW WILSON • DETROIT 3, MICHIGAN

WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne, Calif.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-108

## Electric Stud Heater

A heavy-duty electric heater has been designed to preheat large studs that are used to clamp large castings together on heavy equipment, such as hydraulic presses. Quick heat is provided at the assembly point with the portable electric heating unit.

In order to tighten the nuts securely, the studs must be lengthened temporarily. This is done by drilling a hole through the stud and inserting the stud heater in this hole. The stud expands lengthwise, allowing the nuts to be tightened more than would be possible if the stud were cold. When the heater is withdrawn and the stud cools, a very tight fit results in the same manner that rivets tightly join structural steel members.

The stud heater consists of alloy-sheathed Chromalox electric tubular units fitted in a gun-shaped stainless steel holder. The handle grip aids extraction of the heater. Various sizes and ratings are available to accommodate studs of different sizes. Standard lengths range from 10 to 70 inches; capacities from 2 to 12 kw; and outside diameters from about one-half to one inch.

For more information write to Edwin L. Wiegand Co., 7556 Thomas Blvd., Pittsburgh 8. **T-1-1081**

## Chrome Micrometer

After an extensive series of tests, The George Scherr Co., Inc., 200 Lafayette St., New York 12, has perfected a metal finish called Lustro Chrome, used on this micrometer. This chrome surface is extremely hard and non-peeling.

All graduations are sharp and clear against the dull chrome background, making reading easier and surer, even in poor light. The Lustro Chrome finish protects the micrometer indefinitely from rust and discoloration.

Another feature now available is tungsten carbide tipped anvils. The life span is increased 82 percent with carbide tips. A new bonding method for securing the tips keeps the cost low. **T-1-1082**

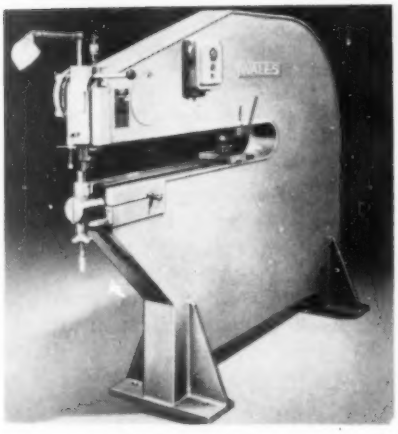
## Control Panel

The cranking cycle of both diesel and gasoline engines is now controlled with automatic precision with Pantro industrial control panels. These specially designed and engineered panels allow the engine to crank for a predetermined interval and rest for an interval. The total number of cycles and time of intervals are adjustable. Provision is made for stopping the sequence when the engine starts. The panel can be made to start the sequence manually as well as automatically. For information, write Industrial Control Panel Co., 247 E. Illinois St., Chicago 11.

**T-1-1091**

## Contour Shear

Introduction of the Wales Tru-edge contour shear has been announced. It is designed for inside cutting, beading and forming sheet steel. A new shearing principle eliminates resistance to feeding and turning the work. In addition, feeding of material may be started while the ram is operating. Inside cutting requires no starting holes, entirely eliminating any preliminary operations.



Unique cam operation provides vibrationless operation. Material is not punched but is sheared to provide a smoothly cut edge. The drive mechanism is simple.

An adjustable bottom shearing die is quickly set for various thicknesses of material. This is one of two simple adjustments that provide fast, easy operation in varying gages and types of sheet metal.

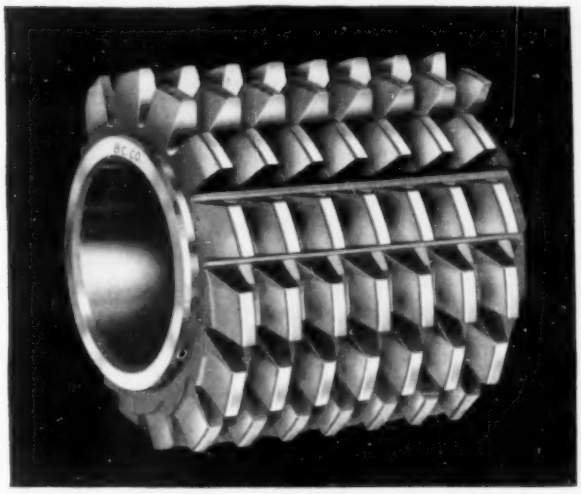
The contour shear cuts from 10 to 36 feet per minute, depending on gage and material. The shearing capacity is up to 10-gage mild steel and 11 gage stainless steel. Throat depth is 48 inches which can be increased by arranging centers outside the throat.

Write the Wales-Strippit Corp., 345 Payne Ave., North Tonawanda, N. Y. for Catalog TS.

**T-1-1092**


# CLASS AA HOBS

## INFLUENCE GEAR TOOTH ACCURACY



*Give You a Maximum Degree of Precision in Finish Gear Hobbing*

For extra precision in gear hobbing, Barber-Colman Engineers have developed Class AA hobs. They are made to consistently closer tolerances than any other hobs, helping to provide the finest in gear accuracy. In addition, they are available with taper bores to further control the accuracy of the gears. The taper bores make it easier to true the hob and eliminate the possibility of an increase in runout during the cutting operation.

Barber-Colman Class AA Hobs have proved themselves in actual production for many years. They are recommended wherever the utmost accuracy is required if other conditions warrant the use of such a fine tool.

In many cases, your gear requirements may not demand this degree of precision control. But whatever your hobbing problems may be, Barber-Colman Engineers will be glad to help you solve them.

*Send For Your Copy of Hobbing Notes . . . "Hobbing Accurate Gears"*

**Barber-Colman Company**

BARBER COLMAN

GENERAL OFFICES AND PLANT, 7101 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

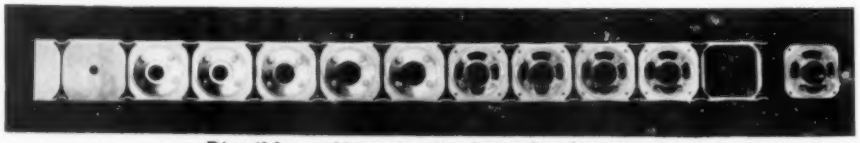
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-109

# B. Jahn PROGRESSIVE DIES SAVE* AMERICAN INDUSTRIES *Millions!*

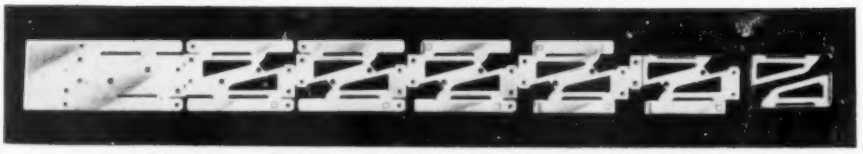
Thousands of unnecessary, costly operations have been eliminated from America's production lines by B. Jahn! Actual die strip photographs illustrate intricate — seemingly impossible tooling problems overcome by B. Jahn's versatility and ingenuity.

Production runs increase — set-up time is slashed — individual press operations are eliminated — better die products result — for every B. Jahn built die is PRODUCTION PROVED *to the customer's complete satisfaction.*

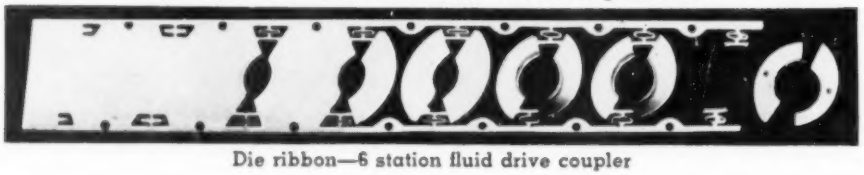
*B. Jahn Progressive dies not only SAVE millions, they MAKE millions!



Die ribbon—11 station loud speaker housing



Die ribbon—7 station double wall bracket for glass shelf



Die ribbon—6 station fluid drive coupler

By running from 10 to 50,000 parts or complete assemblies for customer's production line use *before the die is delivered,* error is eliminated! guesswork ended! chance abolished! The die is certified PRODUCTION PROVED!

***SEND FOR THE FACT-PACKED "STORY OF B. JAHN PRODUCTION-PROVED DIES" NOW!***

Read the many illustrated, money-making case histories! Find out how B. Jahn eliminates major tooling problems for engineers! See the many intricate die ribbons from B. Jahn Dies! Learn about the 165 skilled B. Jahn craftsmen and their ultra-modern facilities! Engineers, this is money-making *must* reading, send today!


*Investigate B. Jahn and Invest in Production Economy!*

PRODUCTION B. Jahn PROVED

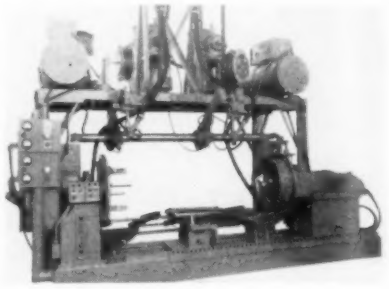
B. Jahn

THE B. JAHN MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-110


## Girth Welder

This machine is engineered to make fillet and burn-through circumferential welds. The main feature is a built-in five-ton hydraulic press for the assembly of parts prior to welding. A two-pressure hydraulic system is incorporated with high pressure for assembly and low for holding parts during welding.

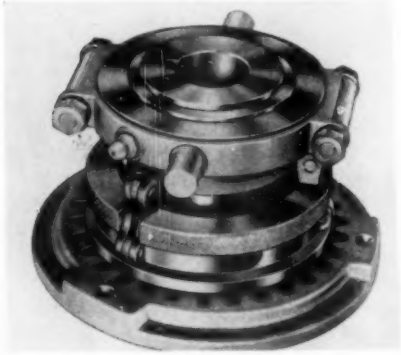


The stationary headstock supports the center spindle drive and gives reaction to the press while the adjustable tailstock houses the hydraulic press cylinder. The press is under push-button inching control and the eject and reload cycle is automatic in operation. Manual longitudinal and radial positioning of the welding heads is provided to cover the machine range.

The machine has a capacity of 9 to 24, 12 to 36, or 18 to 48-inch diameters and up to 96 inches long. **T-1-1101**

## Single-disc Clutch

The Johnson single-disc clutch is specifically designed for light machinery service up to 6 hp; the No. 350 for 3 hp and the No. 450 for 6 hp. If space saving is not of prime importance, the clutch will provide far greater capacity at low cost. They incorporate the same floating disc principle as used in the company's clutches. The disc rides free in neutral, preventing drag, abrasion and heating. A simple hex key frees the knurled ring for easy manual clutch adjustment.



Request bulletin No. 250 from Carlyle Johnson Machine Co., Manchester, Conn. **T-1-1102**

## Tool Grinder

A universal tool and cutter grinder, known as the Sterling model G, has been introduced by the McDonough Mfg. Co. of Eau Claire, Wis.

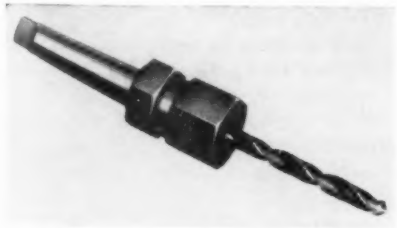
The cast base is designed to dampen vibration. The wheel head rotates a full 360 degrees and the work table swivels a full 180 degrees. The swing over the table is 10¾ inches and the maximum distance between centers with LH and RH tailstock is 27 inches. A workhead with No. 12 B & S taper and No. 50 milling machine taper is standard equipment.

Conveniently located controls make it easy to operate the grinder from front, left-hand or right-hand sides.

The universal machine includes all standard fixtures, i.e., motor-driven workhead, internal grinding attachment, etc. In addition, this machine also features power table traverse and automatic table infeed. **T-1-1111**

## Stub Drill Chuck

The Continental Tool Works, a division of Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, announces a stub drill chuck for use in multiple-spindle heads. Supported in rigid, true-running



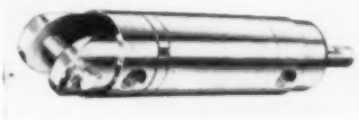
spindles, these chucks project a minimum distance and use short drills so that bushings and bushing plates are not required. This setup is said to increase drill life substantially over the conventional setup in which drill chucks and drills project considerably further beyond their supporting bearings, making it necessary to use guide bushings to locate the holes. With Continental stub drill chucks in rigid spindles, pieces per sharpening and total drill life are increased.

The Continental stub drill chuck is simple and rigid. A U-shaped drive key engages notches in the shank of the drill and fits a groove in the faces of the collet and holder. This provides a positive drive, and also prevents the drill from being pushed back into the collet under feeding pressure. The drills have several sets of notches in the straight shank to provide length adjustment. Write for Bulletin 60224.

**T-1-1112**

## Air Cylinders

A line of T-J Spacemaker air cylinders, whose design eliminates tie rods and reduces head size, is announced by the Tomkins-Johnson Co., Jackson, Mich. This construction results in a saving of up to 40 percent in mounting space, which provides additional room for adjacent equipment without sacrificing strength.



Added strength and an extra high safety factor are achieved with solid steel heads and heavy wall seamless steel body. Cylinder walls are precision honed and hard chrome-plated. Design of the cylinder also features leakproof cylinder head to body construction.

Cup-type piston packings are furnished as standard. Adequate port sizes allow for maximum speed and power with a minimum friction loss. Standard piston-rod diameters are consistent with intended use and desirable stroke length. **T-1-1113**



***NEW** many purpose .*

*individual Vulcanaire*

**DUST COLLECTING UNITS**

*Use* on surface and other grinders where any kind of grinding dust must be removed. Salvage diamond dust.

*Inexpensive*, compact units, with no moving parts.

*Operated* from your present air supply.

*Installed* in a few minutes, eliminating need for costly centrally located dust collecting systems.

*The collector element* is mounted on the side of the machine. Quickly cleaned, requiring no refills.

*Vac-suction pick-up device* (vacuum nozzle) is mounted on the grinding wheel guard or close to grinding wheel on other applications. *This mounting permits constant contact with dust as the wheel is moved up or down.*

*A simple needle valve* operates the unit, and can be shut off when machine is not in use.

*Available in two sizes*: 700 series for grinding wheels 7" dia. or less—200 series for wheels 2" dia. or less.

**"SALVAGE INDUSTRIAL DIAMONDS FOR DEFENSE"***

*That is the title of the National Production Authority's booklet which describes the growing critical shortage of industrial diamond supplies.

The shortage will soon result in idle machine tools, and lost defense production unless we straightway begin to conserve grinding wheels and salvage diamond dust. The N.P.A. fully and helpfully explains the methods for doing these things.

Request this N.P.A. booklet on your letterhead and Vulcan will be glad to send it to you. You will also receive literature on the versatile Vulcanaire Dust Collector which promotes health in your plant and turns dust into money.

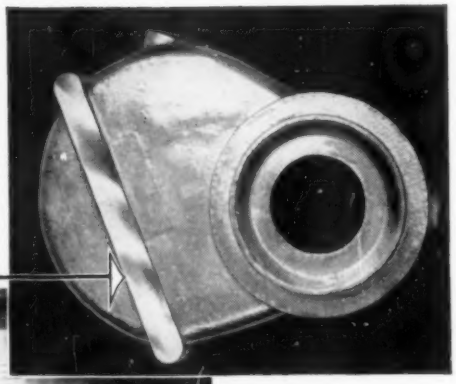
It's made by the makers of Vulcanaire
The jig grinding attachment

**VULCAN TOOL CO.,** • **7300 Lorain Avenue, Dayton, O.**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-111

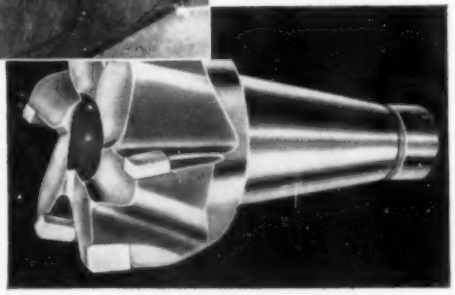
CUTS
# ARMOR PLATE
LIKE BUTTER

PHENOMENAL END MILL PERFORMANCE ON BULLET-PROOF TANK ARMOR PLATE



**PROBLEM: MILL 23½" x 2¼" SURFACE OF TANK CARRIER!**
The material – the toughest armor plate casting yet devised for military purposes! An impossible operation with other types of cutters tested.

**SOLUTION: STOCK REMOVAL ⅜" to ½" IN 3 CUTS –** Finished surface parallel within .002 – NO REJECTS! A smooth machine like finish at 10½" per minute.



**AND HERE'S THE NELCO TOOL THAT SOLVED THIS VITAL DEFENSE BOTTLE NECK!**
The *rugged* virtually *indestructible* NELCO Taper Shank End Mill – A 4" carbide tipped cutter that literally chews away half an inch of the toughest alloy Armor Plate America has produced – leaving a smooth, accurate machine-like finish.

Another of the *impossible* machining problems solved by NELCO tools and the Engineering advice of NELCO Field Engineers. Nelco cutters not only *save money* – they *make money* by performing costly machining jobs in newer ways – better ways!
Write for catalog and details on this husky NELCO TAPER SHANK END MILL and the hundreds of other NELCO Engineered Carbide Tools.– TODAY!

**NELCO TOOLS** *For that Extra Edge in Production*

**NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-112


## Spectrometer

A 90-degree Geiger counter X-ray spectrometer that provides a powerful analysis tool for use in research and educational fields as well as for production control is now available from the Research & Control Instruments Div., North American Philips Co., Inc., 750 South Fulton Ave., Mount Vernon, N. Y.

Designed to provide a full standard range of operation, the new instrument employs a long-life air-cooled X-ray tube and a goniometer having a radius of 130 mm. Angular range is minus 10 degrees to plus 90 degrees (two theta). Angles can be read directly from a dial or from a strip chart with degree pen optional. The angle can be varied quickly by a manual drive or by employing the incorporated motor drive. The Geiger counter position is continuously readable to 0.01 degree (two theta) over the full range.

The high output X-ray generator provides fixed operation at 35 KvP at 6 Ma and operates on 200-240 volts, 50 or 60 cycles. X-ray generator is self-rectified for simplicity and low tube replacement costs. The X-ray tube is air-cooled and can be quickly interchanged. Voltage and current stabilizers are included. **T-1-1121**

## Gearmotor

A Lifeline® single-reduction gearmotor (type B) is available from the Westinghouse Electric Corporation, P.O. Box 2099, Pittsburgh 30.

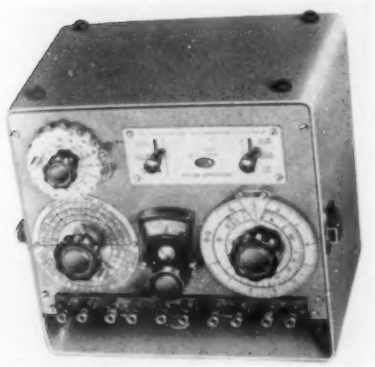
This gearmotor meets the mounting limitation requirements peculiar to side entry agitators and mixers, and is suitable for light duty coupled service applications such as fans and pumps. It is available in ratings from 1 to 30 hp, 780 to 420 rpm, AGMA Classes I and II.

By using reduction gears, gearmotors have the advantage of being able to deliver power at speeds comparable to slow-speed motors while utilizing smaller and more efficient high-speed motors. **T-1-1122**

USE READER SERVICE CARD ON PAGE 131 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

## Impedance Bridge

model 250-CI universal impedbridge and model 855-A1 bridge lator-amplifier combine features of accuracy, wide range, and comess for precision measurements of stors, capacitators and inductors. uracy specifications for the bridge resistance, ± 0.10 percent, capaci- ce, ± 0.25 percent, inductance, ± 1 rcent.

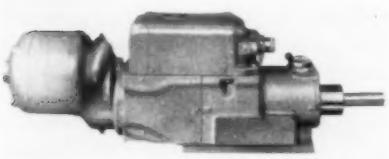


Measurements can be made over the following ranges: resistance, 1 milliohm to 11 megohms; capacitance, 1 micromicrofarad to 1100 microfarads; inductance, 1 microhenry to 1100 microhenrys; storage factor of inductors (Q), 0.02 to 1000; dissipation factor of capacitators (D), 0.001 to 1.0.

The 855-A1 oscillator-amplifier, which fits into the battery compartment of the bridge, converts the bridge to 115-volt a-c operation. It provides a stable oscillator, high-gain null amplifier with plug-in frequency selection, and a tuning eye for visual null indication. With this unit a precision of balance of better than 0.02 percent is possible on most measurements of capacitance and inductance. For battery operation a two-stage amplifier is available. Overall size of the bridge complete with amplifier is only 9 x 11 x 11 inches.

Bulletins on both the bridge and the amplifier-oscillator are available from Brown Electro-Measurement Corp. Dept. TE-1, 1324 S. W. 21st Ave., Portland, Ore. **T-1-1131**

## Hydraulic Drill Unit



An air-powered hydraulic drill unit, No. 19-600, has been added to its drill unit line by Delta Power Tool Div. of Rockwell Mfg. Co. This unit is designed for heavy-duty drilling, tapping, reaming, spot facing, hollow milling and similar operations.

Featuring quick setup, versatile hydraulic feed control, fast traverse to positive stops, simple, compact, rugged design and universal mounting, the drill unit is made for high production applications.

The unit has a maximum stroke of 6 inches and an 1800-lb thrust with 80 psi air pressure. It can use up to a 5-hp motor and 1 1/8-inch drill. Standard spindle used contains a No. 4 Morse internal taper.

Length of stroke control is by means of a positive micrometer stop that is infinitely adjustable from 0 to 6 inches. Depth can be held to within 0.0005 inch. Rapid approach is at a maximum rate of 5 inches per second with infinite adjustment in length up to the full stroke of the unit by means of a positive stop. The rapid return has a maximum rate of 4 inches per second.

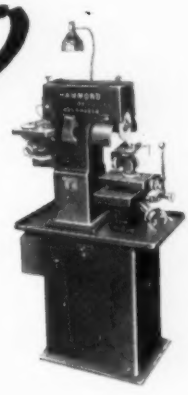
An outstanding feature of the drill unit is the adjustability rate of both rapid approach and return. The feed rate can be adjusted infinitely from 0 to 180 inches per minute. A backfeed valve, for locking out the rapid return, is standard equipment and permits using the feed adjustment on the return stroke for back spot facing and similar jobs. In addition, built-in switches permit interlocking with other drill units or equipment.

For further information, write Delta Power Tool Div., Rockwell Mfg. Co., Dept. HD-H40, 400 N. Lexington Ave., Pittsburgh 8. **T-1-1132**


OVER 6000

Hammond

CARBIDE GRINDERS IN SERVICE



Save

TIME

TOOLS

WHEELS

CB-77 Chip Breaker and Diamond Finishing Grinder

WD-10 Wet or Dry 10" Carbide Tool Grinder

14-WD Wet or Dry 14" Carbide Tool Grinder

MORE HAMMOND CARBIDE TOOL, CHIP BREAKER and DIAMOND FINISHING GRINDERS are being used today — in more plants than ever before — to grind Carbide and High Speed Tools easily, accurately . . . better. Hammond offers "America's Most Complete Line." — Write for Carbide Grinder Catalog No. 225.

Hammond Machinery Builders INC

1661 DOUGLAS AVE. • KALAMAZOO, MICH.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-113

# FOR *Strictly* IMPERSONAL INSPECTION CHOOSE AMES DIAL COMPARATORS

Ames Dial Comparators make the inspection of duplicate parts an extremely simple, rapid and accurate operation. Ames Comparators are strictly impersonal in their accuracy — the results being in no way dependent on the skill or judgment of the operator. The pressure of the gauging members against the work is mechanically determined and therefore uniform.

Check the Ames Dial Comparators shown — one of them may solve a Quality Control problem for you.

***Ames No. 1*** Dial Comparator is an easily adjustable bench model that measures objects up to 2" in cross section. The table bracket may be quickly located and locked in position on the column. The table itself may be further positioned and locked for final fine adjustment. This comparator is designated *Ames No. 1W* when equipped with dead-weight contact pressure and contact area to ASTM specifications for measuring resilient materials, such as rubber, plastics, etc.

***Ames No. 2*** Dial Comparator is a compact, stable bench model for measuring non-yielding materials — sheet metal, glass, hard rubber. The 2" diameter table is adjustable to bring pointer to zero. *Ames No. 2W* is similar to the Ames No. 2, but is furnished with dead-weight contact pressure and contact areas to ASTM specifications for checking textiles, plastics, sheet rubber, etc.

***Ames No. 13*** Dial Comparator features flat-ground, cast-iron base of ample size for using V-blocks and locating fixtures for checking rounds, flats and odd shapes. Also, the No. 13 can be fitted with a fine adjustment for close setting. Accurately adjustable bracket holds any Ames Micrometer Dial Indicator.

***Ames No. 130*** Dial Comparator is designed especially for inspecting comparatively large parts. For this reason, the flat-ground steel base, the adjustable indicator support on which can be mounted any Ames Micrometer Dial Indicator, and the upright column are proportioned to suit the user's particular requirements.

***Send us your Quality Control job specifications, and we will supply complete details and proposal without obligation.***

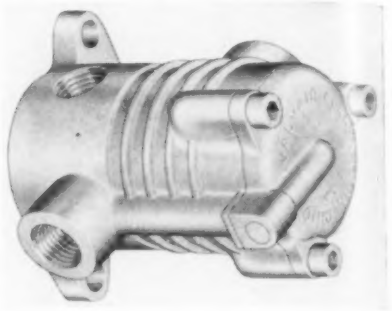
*Representatives in principal cities.* **B. C. AMES CO.** *30 Ames Street Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-114


## Solenoid Pilot Valve

A solenoid pilot valve is now offered by Valvair Corp. The valve measures 3 inches in height. The valve handles air, vacuum, oil, water and inert gases.



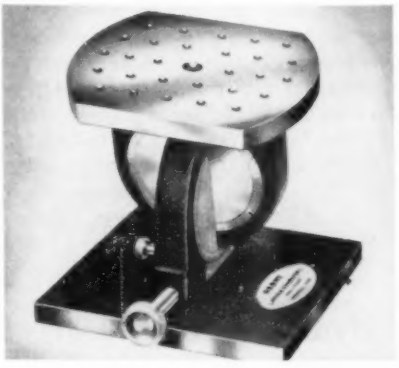
The body and cover are of high-tensile zinc base alloy. The standard coil is adaptable to either continuous or intermittent service. The coil is completely sealed from but is cooled by the fluid or air passing through the valve. There are only two moving parts, plunger and stem. The stem is one-piece and unbreakable. Sealing is by Hycar O-rings which will deteriorate from age only. The valve can be drilled through the bottom for manifold mounting to order. Models include two-way and three-way, either normally open or normally closed.

Manufactured by Valvair Corp., 979 Beardsley Ave., Akron 11, Ohio.

**T-1-1141**

## Angle Computor

The Derry angle computor measures in degrees and seconds any angle, simple or compound, within a hemispherical area on two precision-graduated protractors which are within three seconds tolerance of arc.



No-glare dials make the computor easy to read, and the clutch-type lock secures a precision angular position for job operation. By pulling the vernier release pin, the angle computor can be set to any desired angle quickly and easily. To obtain a precision setting, reinsert the pin and use the key for precision adjustment.

The Derry angle computor is available from Scientific Engineering, 11126 Weddington, North Hollywood, Calif.

**T-1-1142**

## Thread Grinder

A small precision thread grinder has been announced by The Sheffield Corp. It is specifically designed to handle threads 20 pitch and finer. Finest pitch recommended is 124 on a U. S. form, although finer pitches can be ground in the Whitworth form. The machine will handle work up to ½ inch in diameter and 4 inches between centers. It employs the multi-rib wheel.

The lead screw is driven through change gears, making possible an easy and rapid change-over from one pitch to another. Because of its accuracy and precision it is recommended for producing close tolerance fine pitch threads, such as those found on the precision ground taps, thread plug gages, micrometer spindles, elevating and adjusting screws used in precision instruments, and many other components. This machine tool may be equipped with Sheffield Crushtrue dressing equipment, which makes it adaptable for the grinding of some small and intricate forms. Write The Sheffield Corp., Dayton 1, Ohio, for Catalog No. 133-52.

**T-1-1151**

## Drilling Machine

An improved design for its two-spindle, 20-inch swing, model MC-20 drilling machine has been anounced by Sibley Machine and Foundry Corp., South Bend, Ind.

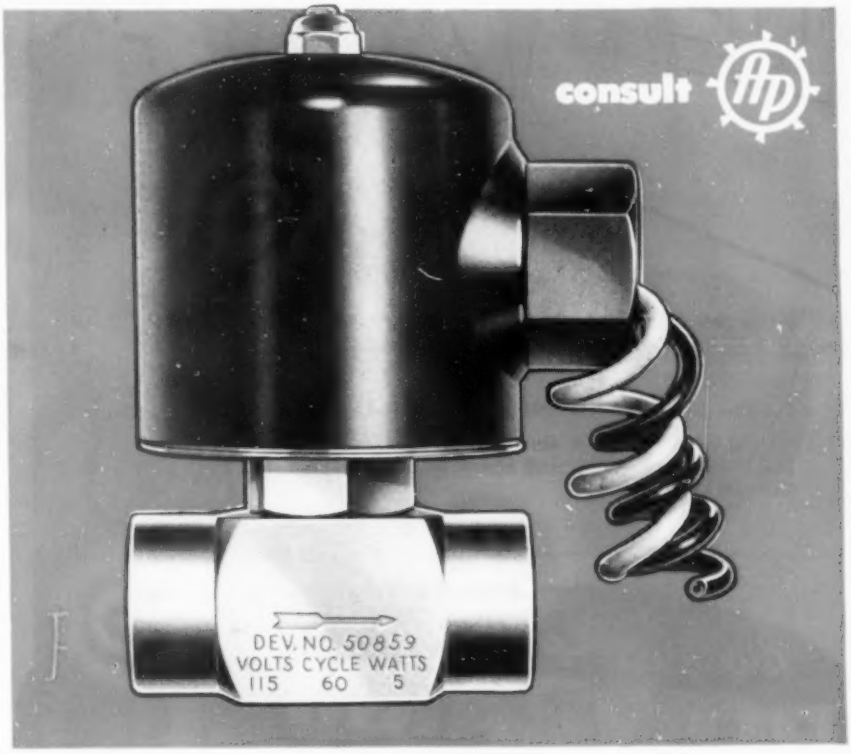
A much sturdier column and heavier base have been incorporated in the new design to provide the rigidity and stamina required for this machine's capacity of 1¼-inch drilling in mild steel. This, coupled with the MC-20's sensitivity for small-size drills, recommends it for a variety of production drilling jobs.

A dial indicator for easy selection of geared power feeds steps up operator efficiency; a spring-loaded lever for changing the eight spindle speeds of 65 to 1360 rpm cuts operator time. Write for Catalog No. 70 for further information.

**T-1-1152**


**If your tooling problem involves**

# AUTOMATIC FLOW CONTROL




**. . . headquarters for automatic flow-control engineering**

*to stop, start, measure, meter, throttle, regulate or to control temperature, pressure, level, expansion of air, gases, liquids or refrigerants*

- Automatic throttling and expansion valves
- Solenoid valves
- Pressure-limiting valves
- Thermo-electric valves
- Aircraft valves
- Refrigerant valves
- Valves for automatic control of gas or liquid flow

Regardless of what your problem may be — whether it involves liquid, gases, air or refrigerant — consult our engineers. Chances are one of the many standard A-P valves will solve your particular problem. If not, we'll work with you to design and build a special control to match your need.

**A-P CONTROLS CORPORATION**

**DEPENDABLE Controls**

2402 N. 32nd St. Milwaukee 45, Wisconsin

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-115


"We'll get that babe out here every month if we can keep using Columbia Exl-die!"

**COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.**

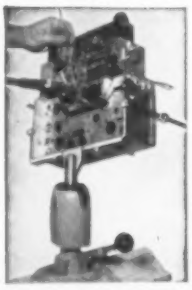
Producers of fine tool steels—High Speed Steels Die Steels—Hot Work and Shock Resisting Steels Carbon Tool Steels.

TOOL COLUMBIA STEELS

Cut Your Costs, Too, With

# POWRARM WORK POSITIONERS

HERE'S HOW OTHERS DO IT



POWRARM cuts costs by increasing every worker's productivity. It gives the worker a powerful *third hand* to hold work while two hands produce. That's why POWRARM works on the most efficient assembly lines in America today, and *belongs on yours.* Write us about your production "headache" . . . we'll show you how POWRARM can cure it.

***Write For Catalog 101E***
***32 informative pages, FREE***

Holds work at any angle in Horizontal, Vertical or Co-axial Plane.

Three sizes of Powrarm—24 to 150 lbs. capacity.

**WILTON TOOL MFG. CO.**

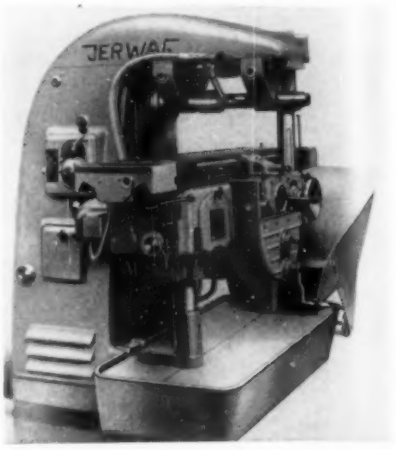
*Precision Built Bench Vises, "C" Clamps and Work Positioners*

**925-H WRIGHTWOOD AVE. • CHICAGO 14, ILL.**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-116


## Milling Machine

A milling machine, the Jerwag designed to make full use of the advantages of the climb or down-cut method of milling without special support or accessories, is now available. The milling machine permits utilization of high-speed cutting tools at their peak efficiency.




On standard milling machines, it is necessary either to reduce feeds and cutting speed far below those considered normal in turning, boring and planing operations with high-speed steels, or to make special provision for converting from conventional to down-cut milling. Because it is built throughout for down-cut milling, the Jerwag machine uses cutters at the full speeds and feeds of which they are capable, lengthens cutter life and produces more accurate surfaces.

In this method of milling, the cutter edge begins to cut immediately upon making contact with the work, eliminating the preliminary gliding and squeezing action which, in conventional milling, results in excessive wear and tear on the tool.

Working surface of the table is 55 x 14 inches. Range is 39.370 inches longitudinal, 13.780 inches vertical, 5.906 inches across. The milling spindle is case hardened and runs in ball and roller bearings. Front bearing takes up radial thrusts; preloaded ball bearing takes up axial thrusts. A drum controller provides six progressive speeds for milling spindle in direct drive, six additional progressive speeds through back gears.

A bulletin is available from Kurt Orban Co., Inc., 205 East 42nd St., New York 17. **T-1-1161**

USE READER SERVICE CARD ON PAGE 131 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

## Slitting Attachment

The Lockformer slitting attachment provides power shearing for sheet metal 20 gage or lighter, handles any width from one inch to infinity and has a tolerance of 1/32 inch on an 8-ft sheet. It is equipped with a mechanically operated back gage which is always parallel to the shear line; it will shear as little as ⅛ inch from a sheet, or the guide can be set as far back as 24 inches so that any slitting job can be handled on material as wide as 48 inches.

The slitting attachment fits models 20 and 22 as well as the portable model 24 Lockformer. It is installed in about 10 minutes and is practically foolproof in operation. Resharpening, when necessary, is confined to two small rolls instead of the two large blades.

Write for Bulletin No. A3, The Lockformer Co., 4615 West Roosevelt Road, Chicago 50. **T-1-1171**

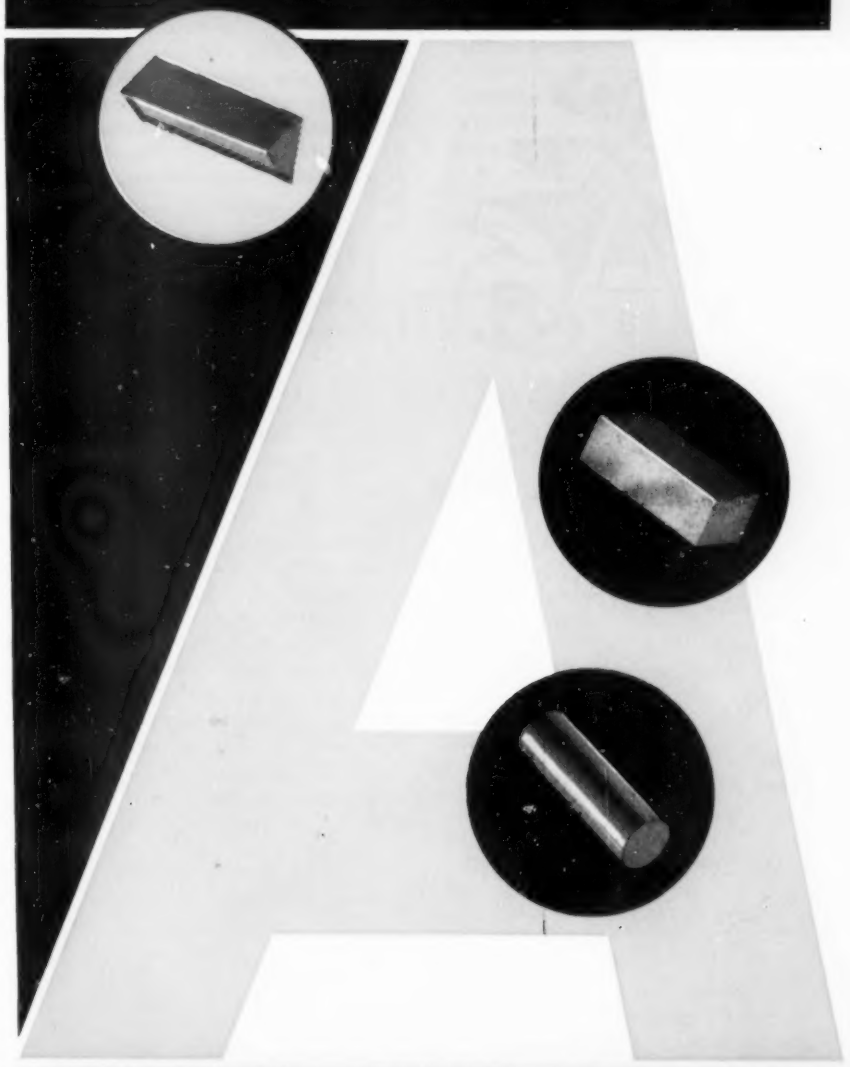
## Rotary Table

Designed for mounting small precision work, this rotary table can be used on a drill press, milling machine, shaper or surface grinder. Accurately spacing drilled holes, indexing clutch teeth, milling circular grooves or T-slots, machining square and hexagon shapes are a few of the many operations that can be performed on this table.

The precision ground work table measures 4½ inches in diameter and three T-slots are provided for clamping the work. The table is rotated by worm gearing having a graduated collar and ball crank. Each graduation indicates a table movement of three minutes and one complete revolution of the ball crank turns the table five degrees. A small knurled thumbscrew permits easy resetting of the graduated collar to zero. The edge of the table is graduated 360 degrees and a clamping lever locks the table in any position. Equipment includes eight work clamping bolts with nuts and washers.

For further information, write to South Bend Lathe, South Bend 22, Ind. **T-1-1172**


# Endurance Insurance for your tools



• Your tools need insurance, too!...the kind that Adamas Carbide gives: • ***Premium*** performance . . . work-proved Adamas Carbide grades, job-engineered to fit both YOUR special and standard applications. • ***Coverage*** against costly down-time...there's no faster delivery in the industry than Adamas'. • This ***protection*** costs you no more . . . maximum tool-life, minimum production costs. • Write, wire or phone for your ADAMAS CARBIDE catalog today, and get the "best tips" in the industry.

ADAMAS®
TUNGSTEN CARBIDE

©1953 ADAMAS CARBIDE CORP. • HARRISON, NEW JERSEY

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-117

TRY THIS BRAND NEW
Cutting Carbide

NP
S-6


Why you should investigate S-6 at once

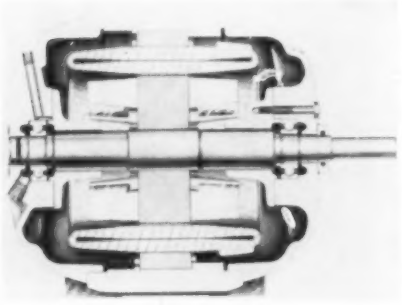
- S-6 Carbide is a brand new and different grade of Cutting Carbide.
- S-6 Carbide performs best at slow speeds where other carbides cannot be successfully used. — It is especially suitable for use on old or slow speed machines.
- S-6 Carbide — excellent for interrupted cuts.
- S-6 Carbide removes stock faster because of permissable heavy feeds.
- S-6 Carbide is *industry-proven* on machining Armor plate, rough steel forgings and castings.

Write today for Catalog No. 108 which shows all other standard grades of Newcomer Carbides.

NEWCOMER PRODUCTS, INC.
General Sales Office
PITTSBURGH 21, PA.
Plant at LATROBE, PA.
INDICATE: A-1-118

## Enclosed Motor

A totally-enclosed motor has been developed by U. S. Electrical Motors, Inc., designated as type SS. It is designed for services where dampness, dust, fire hazards and corrosive fumes are prevalent. Because of its construction, type SS is self-cooling. The smooth exterior lends itself to wiping off or hosing down, an important feature for motors to be used in dusty and dirty locations. Type SS is also provided with a slinger to protect the output shaft bearing against the entrance of dirt or water.



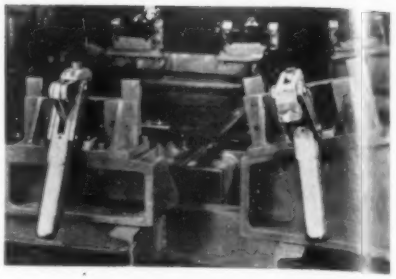
This motor has been approved for explosion-proof service in hazardous locations by the Underwriters' Laboratories, Inc., and bears the official label.

These motors are available in a range from ⅓ to 2 hp (also fan-cooled to 75 hp). Complying with NEMA standards, types SS and SES have these additional features: modern exterior design; sealed terminal chamber; normalized castings; asbestos-protected windings; solid centricast rotor; and an exclusive feature, Lubriflush bearings, which provide an extra large lubricant chamber and provision for forcing the grease through the bearing for a thorough purge of the old grease. For additional information, ask for Bulletin No. 1784, U. S. Electrical Motors Inc., Box 2058, Terminal Annex, Los Angeles 54. **T-1-1181**

## Toggle Clamps

A feature of the La-Ko and Thayer clamps that makes for endurance and sustained accuracy is the Merriman replaceable, hardened steel bushing, installed at all pivot points. These bushings have a serrated surface that cuts its own bearing points. The tiny shavings dislodged by this process wedge the bushings in tightly so that there is no danger of their coming loose. There is no wear on the body of the clamp, no need for reaming new holes for new pins, and less waste.

These clamps are enduring, eliminating the delay that would otherwise occur when it is necessary to stop and replace a wornout clamp which makes scrap, due to its not holding properly because of the rivets having worn into the body of the clamp parts. With the



La-Ko and Thayer clamps, for a new clamp, merely push out the old bushing and push in a new one.

In conjunction with the simple toggle action, there are no more than four pivot joints, which eliminates complications and reduces maintenance costs. The handle is down in locked or unlocked positions to fit the available clamping space, and to give clearance above the fixture for fast loading and unloading.

The Thayer clamp has a hold-down arm and handle of ¾ and 1 inch square solid stock. It provides a maximum holding pressure of 2500 lb.

The La-Ko clamp was designed to fill the need for a light-weight clamp made from a stamping, yet rugged enough to withstand hard usage. It affords a holding pressure up to 650 lb. Made by E and E Engineering Co., 14404 Mack Ave., Detroit 15. **T-1-1182**

## Pilot Valves

An assortment of ten pilot valves, which can be used either two-way or three-way, normally closed to pressure or normally open to pressure, has been introduced by Hannifin Corp., 1120 South Kilbourn Ave., Chicago 24. Designated as series C, and normally furnished only in ¼-inch ips, the new valves can be used either for the direct control of small air cylinders and other air-operated devices or for the direct control of small air cylinders and other air-operated devices or for the remote control of larger units when installed to control either of the P-M master valves, the series B-1 (three-way) or the series BB-1 (four-way). One pilot valve can be installed to operate two or more master valves or, in more complicated all-pneumatic circuits, where cam-operated pilot valves operate like limit switches, there may be several pilot valves operating one master valve.

Basically the same three-way, direct-operated, poppet-type valve mechanism is used in all ten pilot valves, and a choice of operating heads is available.

Oil and corrosion-resistant parts are used throughout. A single, lightly stressed stainless steel return spring is used and this, plus internal friction, is all the operator has to overcome. **T-1-1183**

## Emulsion Cleaner

Pennsalt EC-54, a new type of emulsion cleaner which will not boil off, evaporate or flash at use temperatures, has been developed for metal cleaning by the Pennsylvania Salt Mfg. Co.

EC-54 will clean nonferrous metals without tarnishing and will protect ferrous parts from in-plant rusting. In extensive field trials, according to the manufacturer, this product has proved outstanding in its ability to remove tough soils from difficult-to-clean parts.

Pennsalt EC-54, an emulsifiable liquid, has a flash point of 260 degrees F., a fire point of 300 degrees F. and 95 percent boils within a range of 500 to 600 degrees F. Therefore, it will not boil off or evaporate when used at high temperatures in a power-washing unit. Its flash point is well above temperatures normally used in emulsion spray cleaning.

Particular advantages from these characteristics are that there is negligible loss through evaporation; no solvent vapors condense on plating tanks; the fire hazard is minimized during shut-downs or in drains or sewers, and the cleaning solution can be used at higher temperatures to assure maximum detergency on high melting point soils.

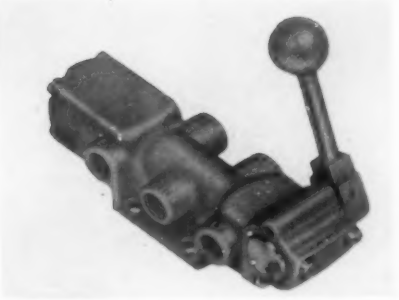
Ferrous parts cleaned with EC-54 are protected against in-plant rusting for a period of one to six weeks. This period can be lengthened by the use of stronger solutions and by omission of the rinse following the cleaning stage.

On nonferrous metals, it will not tarnish aluminum, magnesium, brass or zinc. One cleaning unit can be used to process all metals in a given plant.

Pennsalt recommends the use of EC-54 in power washing units at a concentration of from 1-to-20 to 1-to-100 with water, at a pressure of from 15 to 60 psi, at a temperature of from 160 to 200 degrees F. for from ¼ to 2 minutes. For added detergency alkaline cleaners can be added to an EC-54 spray washing solution. For nonferrous metal cleaning, ⅛ to 1 ounce per gallon of a mild alkaline cleaner may be used, and for nonferrous metals alone, ⅛ to 1 ounce per gallon of Pennsalt No. 30 is recommended for extra cleaning action. **T-1-1191**

## Valves

This line of valves includes two-, three-, and four-way types with a choice of hand, foot, pilot or cam actuating devices, each with or without spring return. The same four actuating devices fit all three valve types in either side, and can be used either singly, or in any



combination of two, to provide for any actuating requirement. In addition, all internal parts are interchangeable in the two-, three-, and four-way types. All Versa valves can be completely serviced or disassembled without disturbing pipe connections and with only one tool, a screw driver.

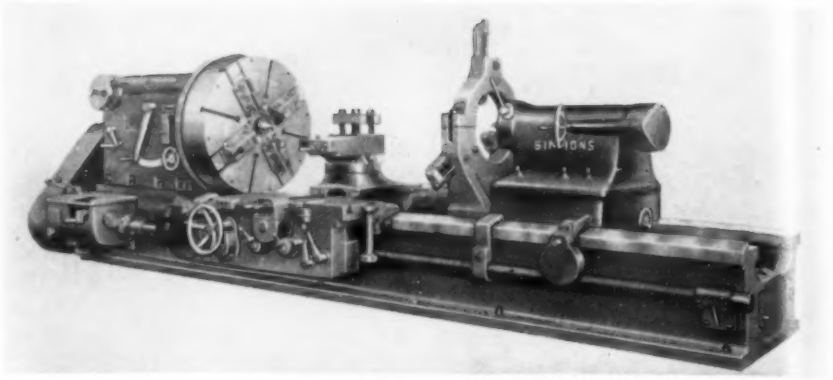
Among the features of the Versa valve is the anti-extrusion arrangement of all the kinetic O-ring seals in each valve type which accounts for their air-tightness. This feature makes it impossible to cut the seal rings in the normal operating pressure range of from 0 to 200 psi. These valves also feature threaded exhaust ports and all ports are plainly marked to facilitate installation. The transverse flow area in all types and sizes corresponds to the pipe size of the valve.

A catalog is available from Versa Products Co., Inc., 249 Scholes St., Brooklyn, N. Y. **T-1-1192**




FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A-1-119

## Heavy Lathe




The Simmons extra heavy 48-inch engine lathe has been redesigned for more power and rigidity and is now particularly well suited for ordnance plants, shipyards and other shops having heavy turning, facing and threading operations, it is announced by Simmonds Machine Tool Corp., Albany 1, N. Y.

Bed lengths run from 20 ft up to any length required, by 5-ft increments. The bed has an angular guide front way. Bed width is 46½ inches and there is now a continuous flange along the bottom for increased rigidity.

The headstock, designed with a minimum of wearing parts, is completely anti-friction with precision dual Timken bearings on the spindle. A variable voltage drive provides a wide range of spindle speed with three gear changes, two through internal face plate drive and one direct to spindle. Normal spindle speeds range from 1 to 144 rpm.

A new feed gear box provides threads ranging from one-half to 56 per inch. The lead screw is now 3½ inches in diameter.

Tailstock spindle has been increased to 7 inches in diameter. All spindles are steel forgings, heat treated and turned and ground to size.

Standard equipment includes the following: thread-cutting mechanism with indicator; compound rest with power cross and angular feed; No. 1 steady rest 6 to 18 inches in diameter; power rapid traverse to carriage; four-stud heavy-duty tool post; forced feed lubrication to headstock and apron; apron control; headstock and tailstock center; motor base, drive sheaves and V-belt guards; operating crank handles and wrenches. **T-1-1201**

## Drill and Deburrer

An electriaclly interlocked machine which drills and deburrs six holes in a steel disc at the rate of approximately 260 pieces per hour has been announced by the Govro-Nelson Co., 1933 Antoinette, Detroit 8. The machine incorporates two Govro-Nelson automatic drilling units, each equipped with a six-spindle multiple head.

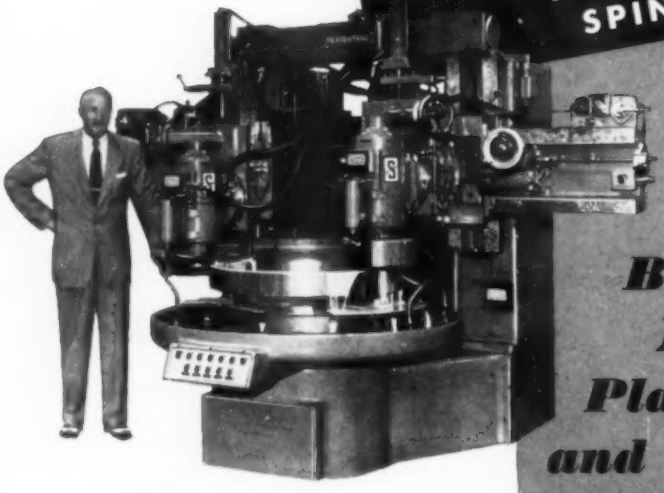
In operation, the operator loads the part on a locator and presses a start switch which causes the part to be automatically clamped. One unit then feeds in automatically to drill six 3/32-inch diameter holes, whereupon the second unit feeds in automatically from the opposite side to deburr the six holes.

When the deburring unit completes its operation, the part is automatically unclamped so that the machine is ready for reloading by the operator.

By using different multiple heads, the machine can readily be adapted to other drilling and deburring operations. **T-1-1202**


**Specify...**

**STANDARD PRECISION SPINDLES**



**For your Boring Mills, Planers, and other machine tools**


**We build special spindles, too!**

A. Harold Frauenthal selects Standard Precision Spindles on his 1800 Series Grinder manufactured by the Frauenthal Division of the Kaydon Engineering Corp., Muskegon, Michigan. Standard Type PAV Vertical Spindle Grinders are the choice of America's leading machine tool builders. Available from ½ to 50 H.P., with speeds of 1200, 1800, 3600 RPM, the PAV is ideal for heavy thrust precision grinding. Available with or without feeds.

Write for catalogue 44 today.

*Standardize with*

**the STANDARD electrical tool co.**

**MACHINE TOOLS**

2499 RIVER ROAD • CINCINNATI 4, • OHIO

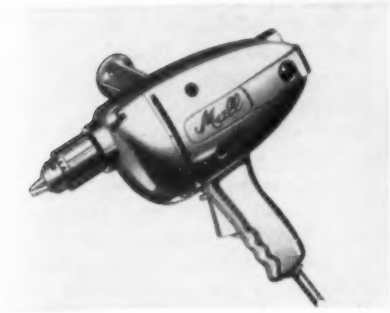
See us at booth 660, Western Metal Congress March 23-27, Los Angeles

FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A-1-120


USE READER SERVICE CARD ON PAGE 131 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

## Portable Drill

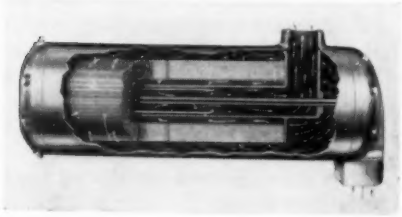
The portable power drill model 127 housed in lightweight aluminum alloy is designed for both heavy and light duty operations. The universal ac-dc motor, hardened heavy pitched gears,



self-lubricating bearings, geared chuck, built-in trigger-type switch, contoured bar handles and a spindle speed of 500 rpm combine for quick, easy and efficient results, according to a recent company survey. This model 127 drill for grinding and drilling comes equipped with 10 ft, three-conductor rubber-covered cord and plug. For polishing and sanding, the same model 127PS comes with the same equipment, except geared chuck, plus a 7-inch backing pad, 7-inch sheep-wool bonnet, 3 assorted abrasive discs and adapter. For further information, write Mall Tool Co., 7725 South Chicago Ave., Chicago 19. **T-1-1211**

## Micronic Filter

A micronic filter especially designed for hydraulic systems can be mounted within the oil tank or reservoir, with removable head exposed. A built-in shut-off valve permits filter replacement without draining the tank. Standard replacement filters are used. The

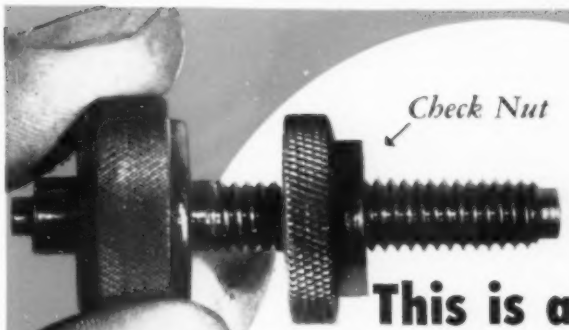


unit may also be mounted externally.

Operating features include high flow rate with minimum pressure drop. Tests with a 25-micron filter on 210 SUS oil at 90 degrees F indicate a flow of 24 gpm with a pressure drop of only 1 psi.

The unit is 25½ inches long overall, and 8 inches in diameter. Inlet and outlet connections are 2-inch female ips.

Information may be obtained by writing Rucker Mfg. Co., 4516 Hollis St., Oakland 8, Calif. **T-1-1212**


**This is a VLIER Torque Thumb Screw**

A trouble-free holding tool that properly supports work pieces against machine tool pressures and *automatically* prevents their distortion due to overtightening. This assures you of precision machining of even fragile parts.

**It Works Like This...**

The free-rotating head contains a ball check that works against accurately controlled spring pressures. Upon arriving at the pre-determined holding pressure, the head rotates freely and prevents overtightening of the screw. "Tight is tight enough!"

**And These Are the Mechanical Details**

Body thread is National Coarse Series Class No. 1 fit. Check nut provided on most sizes prevents backing off under chatter. Holding pressures range from 0-50 lbs. Accuracy and uniformity guaranteed. Made of hardened and rust-proof selected steels. Nothing to wear or break.

**Available in Four Types**

1. Regular—Type A—for normal supporting.
2. Inverted—Type B—Reverse of Type A support.
3. Tee Head—Type C—used with sliding V-Blocks.
4. Adjustable—Type D—set your own holding pressures.

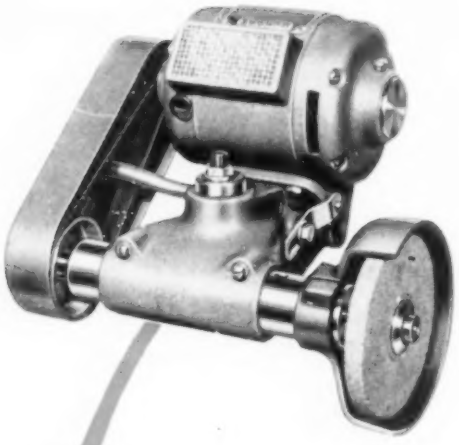
There is a nearby Vlier distributor to serve you. Write today for Catalog No. 53 which includes Spring Plungers, Spring Stops, Fixture Keys and Toggle Pads


**VLIER MANUFACTURING COMPANY**

4552 Beverly Boulevard, Los Angeles 4, California



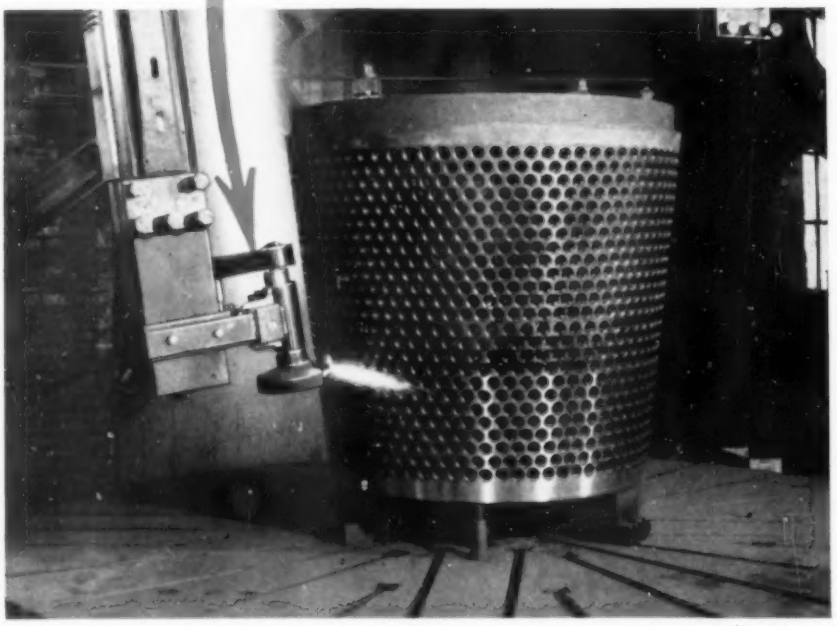

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-121



**DUMORE® tool post grinders**

# add productive capacity

**to your present machine tools**



A Dumore tool post grinder provided the only solution for this unusual problem. Mounted on a vertical boring mill, it halved former production time for grinding on the perforated, tapered surface of 45" cast iron strainer cores.

Put this Dumore grinder on a turret lathe, planer, milling machine, shaper, boring mill or universal grinder. In fact, mounted on any machine you'll get a more versatile tool that will not only machine the workpiece, but finish grind without changing setup — or switching job to another machine. What's more, it delivers precision work to .0001" accuracy.

Production men say the Dumore grinder is the busiest tool in the shop. They like its flexibility . . . the high quality work it turns out. These grinders are ideal, too, for tool room and maintenance work.

Dumore tool post grinders often pay for themselves on the first job. They offer an amazing potential for reducing labor and handling costs... increasing machine capacity . . . improving product quality.

Ask your industrial distributor to show you how Dumore tool post grinders can cut costs for you, or write

**THE DUMORE COMPANY**
1325 Seventeenth Street • Racine, Wisconsin

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-122


## Pressure Meter

A pressure-measuring instrument, as accurate as a mercury manometer but more rugged and convenient to use, has been developed by Fischer & Porter Co. Called the Press-I-Cell, the instrument can measure pressure with an accuracy of one part in 5,000, and has a sensitivity of one part in 15,000. Despite this extreme accuracy and sensitivity, the meter is compact (5-inch diameter, 14-inch length), portable, temperature-stable, and unaffected by vibrations or mounting position.

Also noteworthy is the 600-inch (50-foot) scale which was developed to take full advantage of the accuracy of the instrument's pressure-sensing elements, a set of extremely precise metal capsules, and their follow-up mechanism. An easily-read interval of 1/16 inch on the scale represents 1/10,000 of the full pressure range. The scale, printed on a 35-mm film strip, is virtually unaffected by temperature or humidity changes, since the reading portion of the scale is held to constant length by means of a pair of winding sprockets spaced two inches apart. The movement of these sprockets is fully synchronized with the action of the pressure follow-up system. Scale readings are made on this two-inch section with a hairline etched on a transparent window in the instrument case.

Indicative of the unusual sensitivity of the Press-I-Cell is the fact that the instrument will measure the drop in atmospheric pressure when it is raised about six inches above the table on which it rests; or respond to the pressure change of each escaping bubble of the common bubble-tube type of liquid level measuring system installed in a 50-ft tank.

The instrument can be equipped to operate over a wide range of absolute or gage pressures or differentials. Typical pressure ranges are 1 atmosphere absolute, 400-inch water column, and 150-inch Hg differential. Either of two models is available: manual, in which the proper scale position is found by manual setting; and automatic, in which the scale is correctly positioned by a servomotor. In the automatic instrument, the correct reading is obtained with no hunting or oscillation of the scale whatsoever. Repeatability is rated at one part in 7,000.

Further information can be obtained from Fischer & Porter Co., Hartboro, Pa. **T-1-1221**


USE READER SERVICE CARD ON PAGE 131 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

## Pendant Control

A pendant control on the heavy-duty No. 4 electronic vertical miller manufactured by Reed-Prentice Corp., Worcester, Mass., provides instant push-button control of spindle movement and electronic feed power.

In addition to affording greater ease of operation, the pendant station is useful for spindle jogging when adjusting spindle speed.

The Reed-Prentice No. 4 miller features electronic feed drive for the table, cross slide and vertical slide. Feed rates are infinitely variable and the range of feeds is from ½ to 25 inches per minute.

Centralized operating levers are within easy reach of the operator. Table and cross slides have identical control systems, each consisting of an airplane-type half-handwheel and ball-grip lever. The half-handwheel gives an infinitely variable feed rate in either direction and the five-position ball-grip levers provide feed and rapid traverse in either direction.

The spindle, driven by a 20-hp, 1800 rpm motor, is reversible. For milling nonferrous metals, a 30-hp spindle-drive motor can be used. Spindle speed is quickly selected through a single lever preselector dial in combination with back gear lever.

**T-1-1231**

## File Set

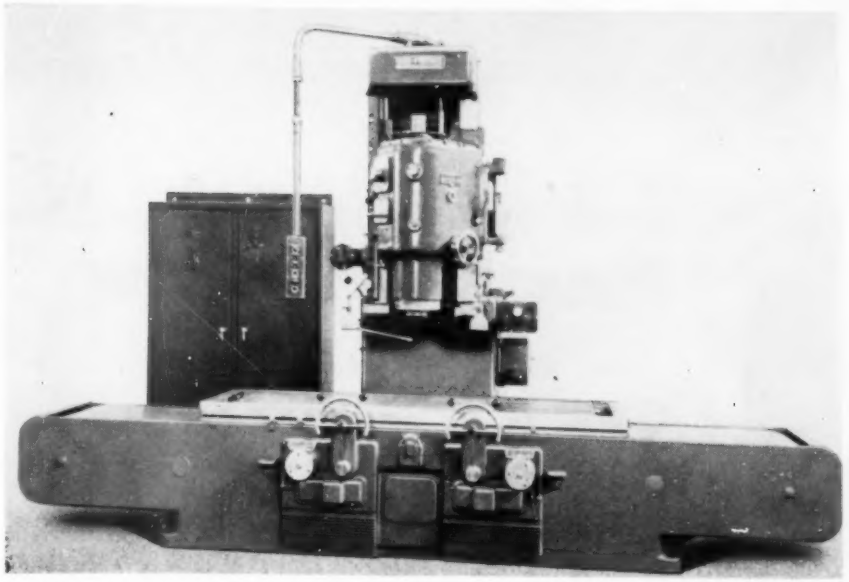
A set of 18 graded files, micrometer-checked to thickness tolerances as low as 09.004 inches, makes precision hand filing possible.

The set is composed of equalling files, no taper in width or thickness, four inches long and a half-inch wide. Each of the 18 files is a different thickness ranging from 0.072 inch down to 0.009 inch, said to be the thinnest file made.

Possible applications of Tacony Micro-Files will be based on their precise dimensions and their ability to file in hard-to-get-at spots that are not accessible to thicker files or to standard finishing equipment.

Typical uses for Micro-Files are precision slot filing, gap filing of electrical contacts and spark plugs and filing in inaccessible spots. Because the thinner files are Slim Jims and flexible to a certain extent, they can get into corners and cracks that could not be reached by standard files. In one actual case, the thinness of the Micro-File solved a production problem for a radio-parts manufacturer—removing excess solder from between closely-spaced plates of special radio condensers.

The set of 18 Micro-Files comes in a vinyl-film envelope, each file fitting into its own pocket. When the files are not in use the kit can be rolled into a compact, pocket-sized package. **T-1-1232**




*There is hardly anything in this world*
*that some man cannot make*
*a little worse and sell a little cheaper,*
*and the people who consider price only*
*are this man's lawful prey.*
JOHN RUSKIN

Placed side by side, similar bushings of different make may look alike — *but are they?*

A·B·C Bushings are, and always have been made from only chromium, or chromium-tungsten oil hardening tool steels having wear resistance 18.5% greater than that of regular carbon water hardening tool steels.*

To capitalize fully on the inherent qualities of these finer steels, A·B·C Bushings are heat treated in one continuous automatic, electronically supervised operation with every step, including quenching, under a protective blanket of neutral atmosphere. This extra precaution insures high wear resistance right out to the initial working surface.

A·B·C Drill Bushings not only *last 18.5% longer,* but are *unexcelled for accuracy and concentricity.* That is why
A·B·C Bushings mean
More Holes Drilled per Dollar

A·S·A STANDARD

*See "A special American Machinist report to the metal working industries" © 1950 by McGraw Hill Publishing Company. Quoted by permission.

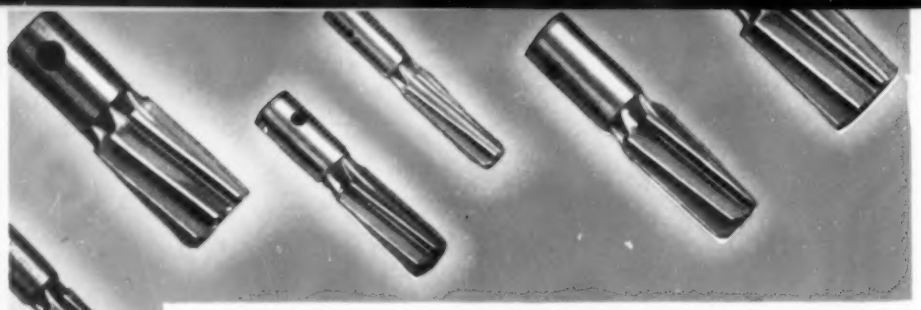
**ACCURATE BUSHING COMPANY**

MAIN OFFICE AND FACTORY:
433 North Avenue, Garwood New Jersey • WEstfield 2-6400

ENGINEERING OFFICE AND REGIONAL WAREHOUSE:
5722 W. Chicago Ave., Chicago 51, Illinois • ESterbrook 8-7180

REPRESENTATIVES IN ALL IMPORTANT INDUSTRIAL CENTERS
*WRITE FOR LITERATURE AND NAME OF YOUR LOCAL DISTRIBUTOR*

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-123

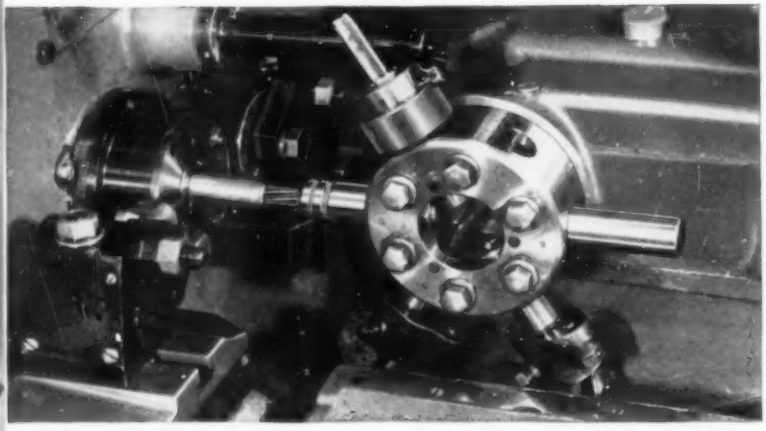


# PRATT & WHITNEY

HIGH SPEED STEEL

## STUB *Screw Machine* REAMERS

REDUCE TOOLING COSTS...
INCREASE OUTPUT



The "P & W" marking is your assurance of outstanding performance. High speed steel, skillful heat treating and correct design with ample chip clearance mean fast, free cutting performance, long life and low cost. Holes are round, straight and accurately sized. P & W FLOATING HOLDERS are recommended as an additional aid to reaming accuracy.

Any decimal size from .060" to 1.010" can be furnished promptly and inexpensively from extensive stocks of semi-finished hardened blanks. The entire range of 24 basic sizes requires only 6 standardized shanks and 5 overall lengths. Required holders, cam changes and set-up times are all greatly reduced. For complete information, write on your Company letterhead to the Branch Office nearest you — or direct to West Hartford; ask for the new Pratt & Whitney Bulletin No. 552.


**PRATT & WHITNEY**
DIVISION NILES BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.

*First Choice* for *Accuracy*

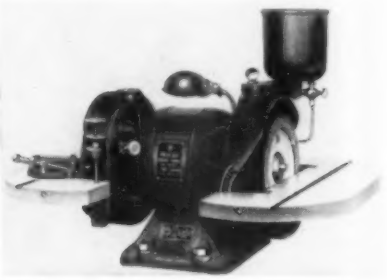
BRANCH OFFICES AND STOCK . . . BIRMINGHAM* • BOSTON • CHICAGO
CINCINNATI • CLEVELAND • DALLAS (The Stanco Co.) • DETROIT • LOS ANGELES
HOUSTON (The Stanco Co.) • NEW YORK • PHILADELPHIA • PITTSBURGH
ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD

CUTTING TOOLS • GAGES • MACHINE TOOLS

*OFFICE ONLY


## Carbide Grinder

A model AA carbide tool grinder has been announced by Thomas Prosser and Son, 120 Wall St., New York City. The machine is equipped with a ½ hp motor and a heavier shaft, providing more reserve power, and greater ruggedness and freedom from vibration than heretofore.



The machine incorporates quick-acting indexing tables which permit instant and accurate angle setting, rigid table lock, and compensation for wheel wear, permitting use of virtually 100 percent of wheels.

It is versatile and can be used with diamond, silicon carbide or aluminum oxide wheels for roughing or finishing work on carbide, stellite or high-speed steel tools.

The carbide grinders are furnished in several models and sizes for both wet and dry grinding. There are various attachments and accessories for chip breaker grinding and drill grinding. **T-1-1241**

## Granite Surface Plates

Surface plates made from a dense, hard and uniformly grained black granite are now available. They have a guaranteed surface accuracy up to 0.00005 inch. The plates permit extremely precise measurements in quality control, manufacturing and inspection, and they will not rust or warp regardless of temperature changes or shock. In addition, they resist abrasion and impact and develop no humps or burrs that have to be removed. The smooth surface permits easy movement of instruments and the nonglare finish prevents reflections. The surface plates are nonmagnetic, require no maintenance and retain their surface accuracy for years.

They are surfaced with extreme care and precision, weigh 190 lb per cu ft, are available with two or four lips and in standard sizes from 12 x 18 x 4 inches to 24 x 36 x 6 inches. Other sizes can be obtained on special order. For additional information, write Lawley Granite Surface Plate Co., 1412 Packard Bldg., Philadelphia 2.

**T-1-1242**

## Face Milling Cutter

Super Tool Company, 21650 Hoover Road, Detroit 13, announces an improved solid carbide inserted blade face milling cutter, designated as the IBH type. The cutter can also be used as a half side mill.

The IBH cutter has only three parts, blade, wedge and screw, to be assembled with the steel body. The body is recessed below each wedge to facilitate quick and easy wedge removal. The threads are in the wedges and not in the body. In the event of an accident with this threaded wedge design, all damage is absorbed by the blades and wedges and the body can be refitted to resume work quickly.

The solid carbide blades are extra heavy and arranged radially for maximum blade life. All blades and parts are interchangeable. An important feature is that the carbide blades can be reversed and used in either right-hand or left-hand bodies.

This cutter is available in six standard sizes: 4, 6, 8, 10, 12 and 14 inch in both right-hand and left-hand and also in specials. **T-1-1251**

## Plant Layout Aid

Pre-printed Labelon adhesive tape eliminates drafting of repetitive symbols. Changes in temporary layouts can be made instantly by simply stripping the tape from its original position and placing wherever wanted. No redrawing or erasing is ever necessary. Since the tape is pressure sensitive, it can be stripped off repeatedly without leaving a mark or losing its adhesive quality.

All standard symbols for walls, aisles, conveyors, monorails, center lines, columns, shafts, stairways, service lines, railroad tracks, sidings, colored arrows for material and process flow, etc. are available in either 324 or 648-inch rolls (or both), scale ¼ inch to 1 ft., in opaque or transparent types. The opaque types are used for photo-copying; the transparent for reproduction on standard ammonia vapor machines.

Tapes are acetate of high-tensile strength and excellent printing quality, wound on heavy cardboard cores, wrapped in foil and packed in separate boxes. Adhesive and all other qualities are retained almost indefinitely whether stored as shipped or applied to layout sheets.

The manufacturer, Labelon Tape Co., Inc. of Rochester, N. Y., states that additional symbols will soon be available as well as a complete selection scaled ⅛ inch to the foot. **T-1-1255**

USE READER SERVICE CARD ON PAGE 131 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

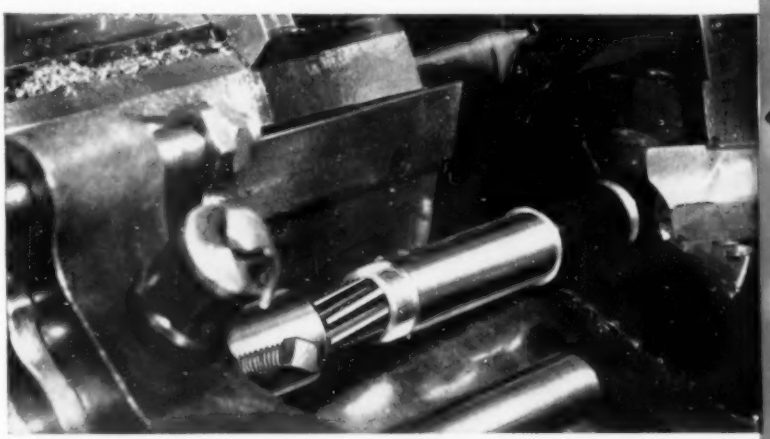


**PRATT & WHITNEY**

*Screw Machine*

**CUTTING TOOLS**

**ASSURE UNIFORM QUALITY and DEPENDABLE ACCURACY**




Manufactured by the most modern processes from only the finest, selected materials, Pratt & Whitney Screw Machine Cutting Tools bring you the combined advantages of careful, precise metallurgical control and uniform quality — resulting in long tool life at lowest cost.

1. Stub Screw Machine Reamers
2. Floating Reamer Holders
3. Monocone Dies and Die Holders
4. Duocone Dies and Die Holders
5. JCO Cut-Off Blades
6. Spiral Point Bottoming Taps
7. Knurling Tools
8. Knurls
9. Blue Helix Chucking Reamers
10. Adjustable Round Split Dies and Holders
11. Ground Thread Taps (all types)
12. Screw Slotting Cutters

Obtainable from comprehensive stock maintained at the P & W Branch Office nearest you, or from Factory Stock at West Hartford, Conn.

**PRATT & WHITNEY**

DIVISION NILES-BEMENT-POND COMPANY

WEST HARTFORD 1, CONNECTICUT, U. S. A.

*First Choice* for Accuracy

BRANCH OFFICES AND STOCK . . . BIRMINGHAM* . BOSTON . CHICAGO
CINCINNATI . CLEVELAND . DALLAS (The Stanco Co.) . DETROIT . LOS ANGELES
HOUSTON (The Stanco Co.) . NEW YORK . PHILADELPHIA . PITTSBURGH
ROCHESTER . SAN FRANCISCO . ST. LOUIS . EXPORT DEPT., WEST HARTFORD

CUTTING TOOLS • GAGES • MACHINE TOOLS

*OFFICE ONLY

ENGINEERS

TO DESIGN, REDESIGN, OR DEVELOP YOUR PRODUCT

ENGINEERS

TO TOOL AND EQUIP YOUR PLANT FOR THE BEST PRODUCTION ECONOMICS

ENGINEERS

TO GET YOUR NEW PRODUCTION GOING AND KEEP IT GOING

ENGINEERS

TO REDUCE YOUR COSTS AND IMPROVE YOUR QUALITY

ENGINEERS, DESIGNERS, CONSULTANTS AND PRODUCTION SPECIALISTS

PIONEER ENGINEERING & MANUFACTURING CO., INC.

19645 JOHN R STREET
DETROIT 3, MICHIGAN

INQUIRIES PROMPTLY ANSWERED

INDICATE A-1-126-1

## Pitch Diameter Gage

The Nilco dial gage is designed to check pitch diameters of gears and splines or any other over-all measurement.

It features the Nilco rotable cam used in the Nilsson standard dial snap gage. With this rotable cam principle there is no lost motion between gaging anvil and indicator.

Floating rolls simulate standard over-all measurements with the rolls as gaging points. These rolls are attached to the gage in such a way as to allow free floating of both anvils, resulting in true pitch diameter reading.

Another feature is that the anvils are removable and interchangeable. They can be removed to check wear or for repdacement by larger or smaller rolls according to the user's diverse requirements. The removable-type roll has not been used previously by any other manufacturer.

The gage also has a retracting lever which collapses the gaging roll and allows the gage to clear the OD of the gear or spline; when the lever is released, the gage automatically aligns the rolls over the teeth of the gear or spline.

The gage is equipped with a 0.0001-inch indicator and can be used on production or inspection. Made by Nilsson Gage Co., Inc., Poughkeepsie, N. Y. **T-1-1261**

## Long-Railed Saw

Designed primarily as a time-, space- and cost-saving tool for the plywood, plastic and metalworking industries, a long-railed model, the MLR-1, for cutting of large sheet stock has been announced by the Hendrick Mfg. Corp.

Available with rails up to 10 feet in length, the MLR-1 requires only half as much space as equipment used in the conventional method of cutting large sheets and can handle 4 x 8-ft sheets with ease. Rails can be tilted from zero to 90 degrees for mitering or rabbeting. Depth of cut can be controlled by raising and lowering the screw jack at each end. With the MLR-1, the saw is drawn through the stock rather than pushing stock across a saw table while the stock is being cut.

Fitted with a hollow-ground or carbide-tipped blade, the cutting tool can be set up for high production output where plywood or plastic sheets are involved, allowing an operator to feed sheet after sheet with speed and accuracy. Similar performance can be obtained in metalworking on sheet metal with the use of an abrasive wheel as the cutting instrument.

For further details, write to the Hendrick Mfg. Corp., 11 Selman St., Marblehead, Mass. **T-1-1262**

PUMPS

FOR COOLANTS, LUBRICANTS, AND ABRASIVE LIQUIDS

PUMPS

POSITIVE DISPLACEMENT AND IMPELLER TYPES

PUMPS

J. I. C. STANDARDS OR DIRECT MOTOR CONNECTED

PUMPS

DEPENDABLE, ECONOMICAL, EFFICIENT

STANDARD OR SPECIAL, FOR EVERY MACHINE TOOL AND INDUSTRIAL USE

Rollway PUMPS

Pioneer PUMP & MANUFACTURING CO., INC.

19645 JOHN R STREET
DETROIT 3, MICHIGAN

WRITE FOR CATALOG

INDICATE A-1-126-2

## Sheet Metal Saw

The Bett-Marr Mfg. Co., Hopkins, Minn., has brought out an improved, heavier model sheet metal saw with all cast frame. The manufacturer says that the added weight assures better stability and accuracy and reduces vibration to a minimum.

This saw will cut 50 to 70 stacked galvanized sheet-metal sheets at speeds up to 15 inches per minute. It is a 14-inch ball-bearing band saw, with blade speeds from 125 fpm to 2200 fpm, adjustable for cutting metals, plastics, wood, iron and steel castings and forgings, and other materials without blade chatter.

Intricate cutting jobs encountered in duct-work fittings can be done on this saw in a fraction of the time necessary for hand-cutting. The 20 x 22-inch table permits handling of large work.

Case-hardened guides with carbide back-up bearing (adjustable up to ½-inch blade width) assure positive blade control and cutting accuracy. Flanged wheels control blade for smooth radius cuts and perfect straight-line cuts. Complete equipment includes a set of four sheet-metal clamps and riser bar insert to match for cutting stacked sheet metal. Extra attachments are available for precision circle-cutting and for longer-than-throat depth.

**T-1-1271**

## Compact Degreaser

A Detrex VS Jr degreaser is announced by Detrex Corp., Detroit 32. This unit is designed to clean small and medium-sized parts and is suited for shops, laboratories and small manufacturing plants where production up to 600 pounds of steel per hour must be degreased.

Two standard, manually operated models of the VS Jr are available. One is electrically heated, the other operates by steam. Both degreasers may be relocated at any time in various work areas as long as service facilities are available.

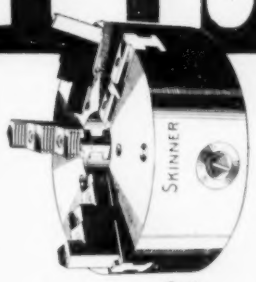
In the VS Jr degreaser, parts are suspended in pure solvent vapor which rapidly dissolves dirt and grease. A spray of hot solvent flushes away any loose, stubborn soils which might remain. Finally, a rinse in pure solvent vapor leaves the work clean and dry.

All work may be placed in baskets or on racks or hooks for handling. Work may be carried in and out of a degreaser either by hand or a small hoist. The equipment is 48 inches from the top to the base.

The interior of the equipment is coated with Detrex FF-1, the nonporous coating which is corrosion-proof and unaffected by degreasing solvents.

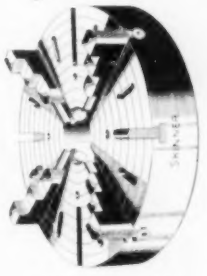
**T-1-1272**

SKINNER




quality

**SCROLL CHUCKS** Self-centering models for light, medium and heavy duty jobs in tool room or for production runs. Available in sizes from 3" to 18" with semi-steel or forged steel bodies, and heat-treated alloy steel for all other parts. Provided with two sets of solid jaws or two-piece jaws for holding internal or external work. Lands on the jaw, jaw steps and end bites are ground after the chuck is assembled.



**INDEPENDENT CHUCKS** Models for medium and heavy duty tool room and general machine shop work. Available in sizes from 4½" to 36" with semi-steel, steel, or forged steel bodies. All other parts are heat-treated alloy steel. Jaws are solid reversible or two-piece with reversible tops for either internal or external gripping. The body surrounds more than 60% of each operating screw for the full length of the screw to assure proper alignment at all times.

accuracy

**AIR & POWER CHUCKS** Self-centering models for heavy duty production work on engine and turret lathes and automatics. Sizes from 6" to 24" with forged steel bodies, and with either 2 or 3 jaws are available. The wedge angle is such that work is gripped positively regardless of jaw position. The chuck will not release the work, even if air line is broken, until operator actuates draw bar. Skinner also has a complete line of power chucking accessories.

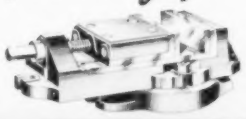
**MACHINE VISES** Skinner vises are accurate, fast acting and positive gripping. Series DPV wrench-operated Vises have semi-steel body and hardened and ground work holding surfaces. They have all the universal features so necessary for drill press operations. Clamp the work for drilling in one plane — drill — turn the vise on edge for all right angle drilling operations.

Series FS Vises have swivel base for accurate indexing necessary in milling operations. Top of the movable jaw is ground parallel to the base for use as an indicating base for setting cutters, trueing work, etc.

long life

***Details on the full line of products are included in Skinner General Catalog — write to the company or your nearest Skinner distributor for a free copy!***

positive grip



**THE SKINNER CHUCK COMPANY**
**212 Edgewood Ave., New Britain, Conn.**

THE CREST OF QUALITY

SKINNER CHUCKS

Chucks - Vises

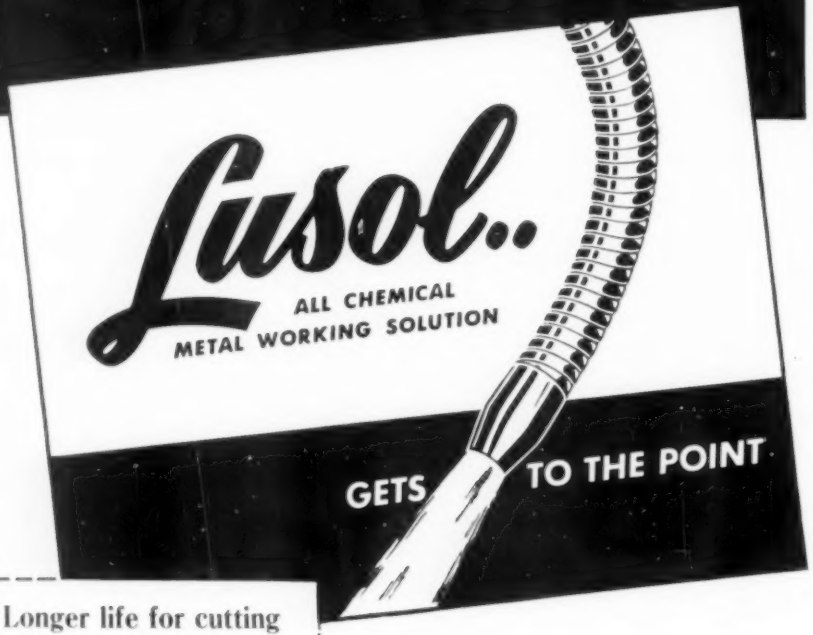
FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A-1-127

# Production News

ABOUT *Lusol*.. —THE ALL-CHEMICAL METAL-WORKING SOLUTION

FROM F. E. ANDERSON OIL COMPANY, INC. • PORTLAND, CONNECTICUT


## Modernize your Machining with this All-Chemical Coolant




Longer life for cutting tools

★

Machine output doubled and tripled

★

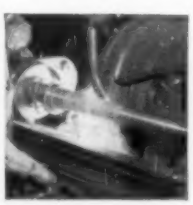
Fewer dressings for grinding wheels

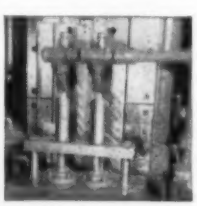
★

Better working conditions for machine operators

Performance of Lusol All-Chemical Metal-Working Solution has been proved in hundreds of plants all over the country. Let our representative show you, in your own plant, how you can also get more production from the same machines and tools.

*Send for your free copy* of the booklet, "Lusol Gets to the Point." F. E. Anderson Oil Company Inc., 213 Portland, Connecticut.




## Investment Casting Furnace

To meet the need for an efficient method of producing precision castings, especially in the jet aircraft field, the Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich. has introduced the type IC, 12-kw, 10-lb indirect arc electric furnace.

This furnace consists of a melting chamber and transformer combined into a single unit. The melting chamber has a two-piece refractory seated in a granular insulation and is provided with tubular entrances for electrodes and for pouring. The investment mold clamps onto the shell face plate by means of compressed air. **T-1-1281**

## Die Lubricant

A drawing compound, X-60, developed by The Metalloid Corp., Huntington, Ind., is claimed to be increasing production in several installations up to eight times per die dressing by limiting heat generated that causes welding and pickup on the dies. Applicable for both simple and reverse dies, Metalloid X-60 also gives improved surface finish due to the elimination of pickup which causes scratches and scuffing of the shell.

Due to the absence of pigment in the material X-60 will not deposit or gum on presses or ways. Corrosion problems are eliminated with the material, according to the manufacturer, since the material does not break down and has a pH factor of seven.

In numerous instances Metalloid X-60 has served as a protective coating when shells required temporary storage between draws. In multi-stage draws, requiring interim annealing, Metalloid eliminates subsequent cleaning operations since the material burns off clean during the anneal without forming scale or other deposits. Cleaning operations can be performed in any conventional manner in use by a plant, including vapor degreasing or caustic solutions. **T-1-1282**

## Power Notcher

power machine for notching sheet rial has been announced by O'Neil- Mfg. Co., 625 Eighth Ave., Lake Minn.

esignated Di-Acro power notcher. se of this machine in some metal- king operations is said to save a e part of the cost of expensive dies heavy presses. A notch as large x 6 inches can be made in 16-gage et steel, and notches both larger and aller than 90 degrees, as well as me straight shearing jobs, can be erformed by making a few simple ad- stments.

Rate of production is high, up to 180 strokes per minute. A foot-actuated clutch leaves both the operator's hands free for work handling. Single stroke action of clutch prevents accidental work damage. The flywheel is driven by either a single or three-phase ½ hp electric motor. Danger from exposed moving parts is eliminated and greater work visibility is provided the operator by housing all moving parts in a steel cabinet. It occupies a floor space 17 x 28 inches. The 12 x 18-inch work table provides large material support area, makes for easier work handling and positioning. Gages for adjusting depth and angle of notch are mounted on the work table for quick setup and change-over. **T-1-1291**

## Center Distance Gage

With the Center-Mike, inspectors now can measure distances between hole centers quickly and accurately without knowing diameters and without mental figuring or pencil work.

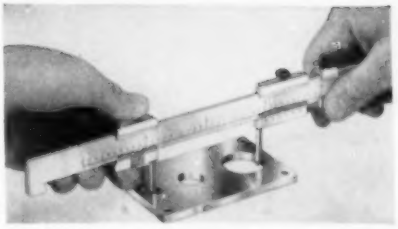
This gage produces a direct reading of center distance. It requires no setup and is always ready for use on any combination of hole diameters within its range.

Basically, the Center-Mike is a vernier gage and a slide rule combined. In operation it is first set to the closest points on the two holes and then is reset to the farthest points on the same holes. While the operator makes these settings, the two lengths automatically are registered and their average value computed by the Center-Mike. This value, which equals center distance, appears on a double-size vernier scale.

The operating sequence employs a compensating principle that reduces the effect of differences in "feel" between operators.

Center-Mikes are used for measuring the distance from a hole center to a parallel surface.

Center-Mikes come in three sizes; for maximum center-distances of 4.400, 7.400 and 12.400 inches, respectively. All sizes will measure center distances ranging upward from 0.240 inch to



their respective maxima. All sizes are useable for any combination of holes where both are larger than 0.200-inch diameter. Optional supplementary contacts will extend the range downward to 0.061-inch diameter. Work contacts are tungsten carbide and scales are machine-graduated.

Center-Mike is made by Sorensen Center-Mikes, Inc., 264 Kossuth St., Bridgeport 8, Conn. **T-1-1292**


AN IMPROVED STANDARD COUNTERBORE DESIGN by ECLIPSE

NEW!

FLUTE DEVELOPMENT GIVES YOU

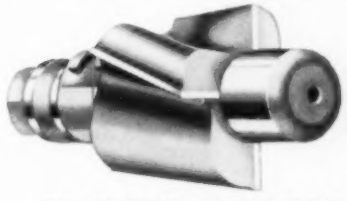
★ Deep counterboring with a wider range of pilot sizes.
★ A higher helix angle which assures faster chip disposal.
★ New tooth construction thus providing maximum heat dissipation.

The DIFFERENCE at a glance!

End view of counterbore showing conventional flute form, designed for spot facing and shallow counterboring.

New style flute form designed for spot facing and deep counterboring, chips can flow freely from pilot diameter.

Side view of counterbore showing conventional flute design which provides ample chip clearance for shallow counterboring and spot facing.



New style flute form with increased helix angle permitting faster chip removal, thus reducing heat to a minimum in deep counterboring.

Our present stock is being replaced with the new design as rapidly as possible so that in the very near future all orders will be filled with this later design within the range of sizes provided.

ECLIPSE COUNTERBORE CO.
Founded in 1913
DETROIT 20, MICHIGAN

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-129

IT'S HERE! the inside story on internal accuracy...


SIMONDS ABRASIVE CO.

Grinding Wheels

Here's the *right* start for an *exact* finish . . . Simonds bulletin on internal grinding wheels. It tells you *why* they're right . . . *why* they grind fast and cool . . . *why* they give the same high precision each time you order them.

You can have this bulletin free, together with the name of your Simonds distributor. He can supply you with Simonds Abrasive Company grinding wheels for every job . . . snagging, finishing, sharpening, cutting-off and polishing.

Write requesting bulletin ESA-29.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co. Ltd., Arvida, Que.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-130

## Who's Meeting - and Where

**Jan. 11-13.** Institute of Scrap Iron & Steel, Inc. Annual convention, Hotel Commodore, New York. Write Institute headquarters, 1729 H St., N.W., Washington, D. C. for details.

**Jan. 12-13.** Industrial Furnace Manufacturers Assn., Inc. Midwinter meeting, Cleveland Hotel, Cleveland. Full particulars are available from association headquarters, 412 Fifth St., N.W., Washington, D. C.

**Jan. 12-16.** Society of Automotive Engineers. Annual meeting and engineering display. Sheraton-Cadillac Hotel, Detroit. Contact headquarters, 29 W. 39th St., New York 18, for complete information.

**Jan. 15-17.** National Tool & Die Manufacturers Assn. Winter meeting, Sorrento Hotel, Miami Beach, Fla. Details may be obtained from association offices, 907 Public Square Bldg., Cleveland.

**Jan. 19-21.** Hydraulic Institute. Annual meeting. The Homestead, Hot Springs, Va. Contact Institute headquarters, 122 E. 42nd St., New York.

**Jan. 19-22.** Plant Maintenance Conference. Fourth annual conference. Public Auditorium, Cleveland. For additional information, write the exposition management, Clapp & Poliak Inc., 341 Madison Ave., New York 17.

**Jan. 21-23.** Society of Plastics Engineers. Ninth annual technical conference, Hotel Statler, Boston, Mass. More facts are available from society headquarters, 409 Security Bank Bldg., Athens, Ohio.

**Jan. 26-27.** Compressed Gas Association, Inc. The Waldorf-Astoria, New York. Association headquarters, 11 W. 42nd St., New York, can give details.

**Jan. 26-30.** Dr. John Gaillard mechanical engineer on staff of ASA, will conduct his next five-day seminar on industrial standardization, Columbia University, Engineering Societies Bldg., 29 W. 39th St., New York. For further details and registration, write Dr. Gaillard, 400 W. 118 St., New York 27.

**Feb. 2.** Machine Design Conference sponsored by Cleveland Engineering Society, will meet to discuss methods in design, engineering, invention and other pertinent problems. Contact society office, 2136 E. 19th St., Cleveland 15.

# THE TOOL ENGINEER'S *Service Bureau*

TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

| LITERATURE NUMBER | COMPANY | BULLETIN | DESCRIPTION |
|---|---|---|---|
| A-1-203 | Allegheny-Ludlum Steel Corp. | C-2 | 28-page booklet shows complete line of Carmet Standard cutting tool blanks and cutting tools, with specifications. |
| A-1-237 | Allied Products Corp., Richard Bros. Div. | | Save time in die designing, construction and use by adopting the R-B piercing system. |
| A-1-185 | American Brass Co. | B-39 | Formbrite—light in weight. Operations better, cheaper and faster. |
| A-1-228 | American Broach & Machine Co. | | American VP 3-10-30 Vertical broaching machine speeds production. Result of skill and experience of American engineers. |
| A-1-180 | American Drill Bushing Co. | | King-size selection of standard types and sizes of bushings immediately available through exclusive distributors—new catalog. |
| A-1-142 | Armstrong-Blum Mfg. Co. | ST650 | Marvel High-Speed-Edge hole saws saw holes accurately in one short operation. |
| A-1-109 | Barber Colman Co. | | Class A A Hobs influence gear tooth accuracy. Maximum degree of precision in finish gear hobbing. |
| A-1-119 | W. O. Barnes Co., Inc. | | Barnes new Handbook of Metal Sawing explains how band saw blades combine safety, economy and convenience. |
| A-1-230 | Beaver Tool & Engineering Corp. | 52 | Beaver tools are workin' fools. No knockout—no realignment—no down time. |
| A-1-198 | The Bellows Co. | CL-30<br>BGF-5A | Better production possible with "Controlled-Air-Power." Reduces scrap. |
| A-1-202 | Besly-Welles Corp. | | Besly Disc Grinder Booklet gives detailed story of Multi-purpose radial-head face grinders. Continuous operation—no idle machine time. |
| A-1-196 | The Carlton Machine Tool Co. | 1 A, 3 A, 4 A, 5 A | Bulletins list all radial drill requirements. Count on Carlton for capacity production, flexibility and performance. |
| A-1-178A | Carboloy Dept. of General Electric Co. | Catalog PM-100 | Catalog describing use of permanent magnet sheet-steel separators to prevent feeding of doubles. |
| A-1-178B | Carboloy Dept. of General Electric Co. | Manual D-124 | Handy, all-inclusive guide showing how easy it is to design, use and maintain carbide dies. |
| A-1-204 | Cincinnati Milling Machine Co. | M-1759 | Cincinnati 26" Hydroform improves quality of deep drawn parts. Reduces springback; improves dimensional accuracy. |
| A-1-26 | The Cincinnati Shaper Co. | S-6<br>B-3 | Cincinnati shears and brakes bring about real cost reductions. Floor-to-floor time decreased. |
| A-1-158 | Crane Packing Co. | TE 1 | Data on complete line of lapmasters available in bulletin. Precision flatness, finish and parallelity in production quantities. |
| A-1-139 | Delta Power Tool Div., Rockwell Mfg. Co. | AD-723 | Machining problems solved. Delta Drill Unit multiplies production—breaks bottlenecks. |
| A-1-208 | The du Mont Corp. | C-1 | Chart gives complete information on sizes and pieces of du Mont super high-speed ground bits. |
| A-1-165 | Gidding & Lewis Machine Tool Co. Davis Boring Tool Division | A20 | Bulletin tells how to beat multiple setups, cut unit costs and increase machine flexibility. |
| A-1-163 | Gisholt Machine Co. | | Free booklet "Static and Dynamic Balancing" gives facts on greater safety, less wear, better service, and distinctly longer life. |
| A-1-113 | Hammond Machinery Builders | 225 | Grind carbide and high-speed tools easily, accurately, better. Save time, tools, wheels. |
| A-1-169 | Hannifin Corp. | 57W | Complete line of Air-control equipment; designed for smooth, accurate, positive control of air-operated equipment. |
| A-1-200-1 | Hapman Conveyors, Inc. | TE153 | Speed, efficiency, dependability, economy—a few of Hapman multi-operation machine's advantages. |

## USE THIS HANDY FORM

to obtain further information about advertisers, trade literature or tools of today appearing in this issue of THE TOOL ENGINEER. No postage needed.

153

*THE TOOL ENGINEER, DETROIT 21, MICH.*

READER SERVICE CARD

Please send me further information as indicated below:

(Mark Key Number of trade literature, tools or advertisements)

| ADVERTISERS | TRADE LITERATURE | TOOLS OF TODAY |
|---|---|---|
| A— | L— | T— |
| A— | L— | T— |
| A— | L— | T— |
| A— | L— | T— |

NAME _____ POSITION _____

FIRM _____ BUSINESS _____

Please Check One ☐ Firm Address ☐ Home Address } STREET _____

CITY _____ ZONE NO. _____ STATE _____

# THE TOOL ENGINEER'S *Service Bureau*

TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

| LITERATURE NUMBER | COMPANY | BULLETIN | DESCRIPTION |
|---|---|---|---|
| A-1-3 | Hardinge Bros., Inc. | 36 | Catalog contains complete descriptions, specifications, and ordering information on collets and feed fingers for Brown & Sharpe machines. |
| A-1-236 | Haynes Stellite Co., Div. of Union Carbide & Carbon Corp. | | New manual "Haynes Stellite Metal-Cutting Tools" gives hints on how to speed up cast iron milling jobs. |
| A-1-105 | Ideal Industries, Inc. | | Multi-duty models for big or little turning jobs. Accurate and durable. |
| A-1-110 | The B. Jahn Mfg. Co. | | "Story of B. Jahn Production-Proved Dies" gives many illustrated money-making case histories. |
| A-1-30 | Kling Bros. Engineering Works | 245A | Hairline precision and speed in sheet and plate cutting; saves time—improves accuracy—cuts costs. |
| A-1-13 | Lapointe Machine Tool Co. | BSM-5 | Simplified "Touch Controls" eliminates all need for skill in sharpening broaches. |
| A-1-19 | Lindberg Engineering Co. | 1440 | Bulletin pictures and describes standard models; illustrates 11 cost-reducing features. |
| A-1-162 | Metal Carbides Corp. | KL-52 | Circular points out special advantages of Klamp-lok tools—rugged, rigid, extra strong. |
| A-1-155 | Modern Tool Works Div. Consolidated Machine Tool Corp. | M-103 | Increase production through elimination of stoppage for tool change. Full information in bulletin. |
| A-1-23 | Morse Twist Drill and Machine Corp. | | Handy 12-page pocket-book gives complete specifications on new line of Morse special-purpose taps. |
| A-1-192 | National Acme Co. | DT-52 | New catalog on Vers-a-tools and Nameo solid and collapsible taps describes versatile, time-saving tools. |
| A-1-135-2 | Nilsson Gage Co., Inc. | | Portable Pitch Diameter Gage gives instantaneous, accurate reading of pitch diameter. |
| A-1-209 | Oakite Products, Inc. | | Oakite Anti-Rust Kit tells about three ways to stop rust in the plant. 16-page illustrated booklet included. |
| A-1-148 | Ohio Crankshaft Co. | | How to balance your production budget given in free copy "Typical Results of Tocco Induction Brazing and Soldering." |
| A-1-207 | Ortman Miller Machine Co. | | Pack more power in less space with OM cylinders. Catalog contains complete, detailed information. |
| A-1-130 | Simonds Abrasive Co. | ESA-29 | The inside story on internal accuracy told in free bulletin on grinding wheels. |
| A-1-222 | Standard Tool Co. | | New hob tolerance chart gives solution for tough jobs—free copy. |
| A-1-120 | Standard Electrical Tool Co. | 44 | Standard precision spindles available with or without speeds. Ideal for heavy thrust precision grinding. |
| A-1-15 | The L. S. Starrett Co. | | Dial indicator catalog and transfer and dimension charts describe standards of accuracy and performance. |
| A-1-136 | Stocker & Yale, Inc. | | Brand New Optical Comparator Brochure outlining 10 Optical Gaging Problems and a brief basic instruction course in Optical Projection Methods offered free for the asking. |
| A-1-137 | Sundstrand Machine Tool Co. | 727 | Design features of automatic lathes make for greater horsepower, wider feed and speed range, faster setup and numerous other advantages. |
| A-1-219 | U. S. Tool Co., Inc. | 80-E | The answers to your press-feed problems given in free bulletin. Controlled accuracy, high versatility. |
| A-1-221 | Waldes Kohinoor, Inc. | | New 12-page catalog gives mechanical details, cutting sizes, extra features; full information on Waldes tools. |
| A-1-134 | Wesson Metal Corp. | | "The Story of Carbide" tells how to meet the needs of today's most difficult metalworking problems. |
| A-1-116-2 | Wilton Tool Mfg. Co. | 101E | Production headache cured by POWRARM. Cuts cost by increasing productivity. |
| A-1-232 | N. A. Woodworth Co. | 52-A<br>49-C<br>51-B | 3 catalogs give information on diaphragm arbors, diaphragm chucks and bevel gear chucks. |

BUSINESS REPLY CARD
No postage stamp necessary if mailed in the United States

FIRST CLASS
PERMIT NO. 10782
(Sec. 510, P.L. & R.)
DETROIT, MICH.

THE TOOL ENGINEER

ASTE Building

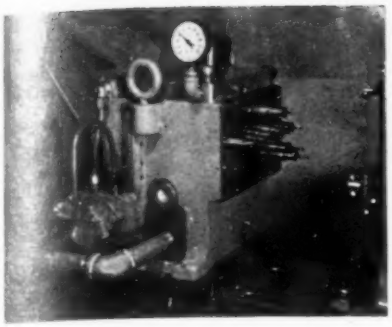
10700 Puritan Ave.

Detroit 21, Mich.

ATT: READER SERVICE DEPT.

**USE THIS HANDY FORM**

to obtain further information about advertisers, trade literature or tools of today appearing in this issue of THE TOOL ENGINEER. No postage needed.



An ultra precision multi-spindle head of a unique design adaptable to an Excello, Heald or Stoker-Unit Horizontal-Precision Boring Machine.

One ten thousandth tolerance on diameters of bores and plus or minus one ten thousandth tolerance on center distance between bores.

These special heads will cut your direct labor costs and increase production per machine.

Send in your inquiries for further information.

Designers and manufacturers of tools, dies, gages, fixtures, special machines, optical checking equipment and precision instrumentation parts.

PTE CO

PIONEER TOOL & ENG. CO.

3914-18 W. Shakespeare Ave.

Chicago 47, Illinois

INDICATE A-1-133-1

# Abstracts of Foreign Literature

By M. Kronenberg

## Machineability Research

A short cut method developed by G. Wagner for determining life of high-speed steel tools is reported in *Stahl & Eisen*, No. 19, 1952. It consists substantially in running tests at increasing cutting speeds. The investigations have been carried out under the sponsorship of the Association of German Mining Engineers (Verein Deutscher Huetten Ingenieure) on 27 different types of steels in order to establish machining data for tool engineers and designers.

The cutting speed is increased at regular intervals in increments of 15 fpm until tool failure occurs, corresponding to a developed chip length of about 45 ft for each speed. A formula developed by the author for a machineability factor based on tool life takes into consideration the cutting speed used at the step before failure, the number of cutting speeds used, the increment in cutting speed and the length of the developed chip at the last step. The initial cuting speed has little effect on the tool life whenever the initial speed is at least four or five intervals lower than the final speed.

The tests covered both German and American steels such as B 1112, B 1113, SAE 4140, SAE 6150, etc., so that the types of German steels which correspond to American steels as far as tool-life machineability is concerned can be determined. The order of machineability tentatively indicated in the Metals Handbook was found to agree with the author's tests.

## Vibration Problems in Machine Tools

The largest amplitude of vibration of a radial drill occurs at the top of the column, according to an article by F. Eisele in *Zeitschrift des Vereins Deutscher Ingenieure* No. 25, 1952.

The end of the arm of the radial drill had the second largest amplitude. The author, who has also measured frequencies and amplitudes at other points of the machine, indicates that frequencies of vibration in machine tools cover a range of about 30 to 500 cycles per second.

Vibration studies in machine tools are receiving increasing attention abroad. The Association of German Machine


*The Finest in Quality Reamers*

L·I

*The Reamer Specialists*

LAVALLEE & IDE, INC.

CHICOPEE, MASS.

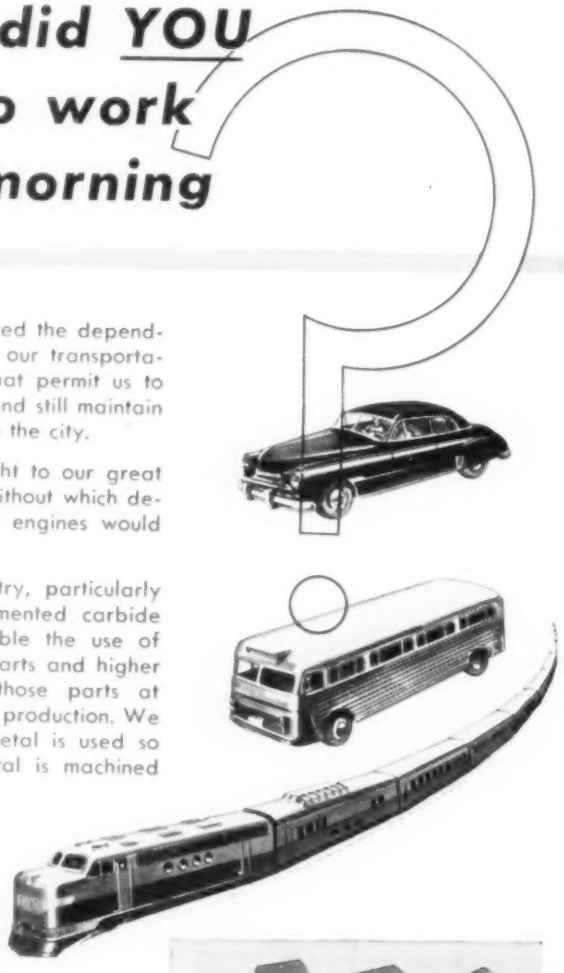
INDICATE A-1-133-2

# How did YOU get to work this morning

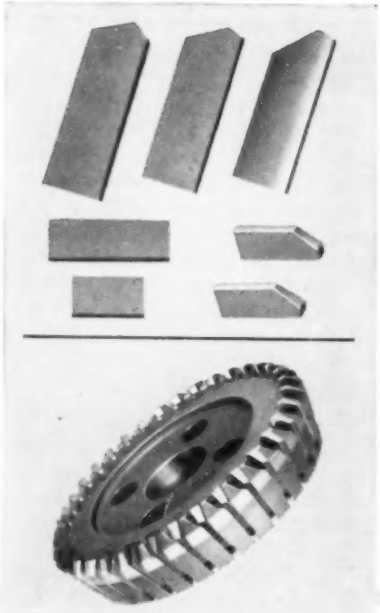
Most of us take for granted the dependable machines that keep our transportation running—machines that permit us to enjoy life in the country and still maintain regular business routine in the city.

We give even *less* thought to our great metal working industry, without which dependable, power-packed engines would not be possible.

The metal working industry, particularly the manufacturers of cemented carbide cutting tools, make possible the use of better metals in engine parts and higher precision machining of those parts at unbelievably high rates of production. We are proud that Wessonmetal is used so extensively wherever metal is machined by carbide cutting tools.



Wessonmetal blades — standard and special—uniform cemented carbide—only slightly less hard than a diamond—are scientifically formed in various grades to provide toughness, strength and other qualities to meet the needs of today's most difficult metal working problems.




*Write for . . .*

**the story of Carbide**

## WESSON METAL CORPORATION

LEXINGTON KENTUCKY

AFFILIATED WITH

WESSON COMPANY

FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A-1-134


Tool Builders has equipped a mobile unit for this purpose, moving from plant to plant to assist machine tool users and builders in problems associated with the measurement and elimination of vibration as a means for improving tool life and surface finish.

Vibration in machine tools is also the subject of an article by E. Dornfeld in *Werkstattstechnik und Maschinenbau* October, 1952, dealing with hydraulically driven planers and slotters. The author recommends a single cylinder design for the table drive for short strokes (not more than about 18 ft) and a twin cylinder design in series for longer strokes, because the compressibility of the oil depends among other factors on the length of the oil column. Several formulas are presented for calculation of hydraulic compression and for the frequency of vibration, although the damping effect of the oil is disregarded.

From a diagram referring to three different planers with a table weight including the weight of the workpiece of 9250, 26,000 and 60,000 lb respectively, it is concluded that the natural frequency of vibration decreases according to an exponential law as the stroke of the planer increases. Since the natural frequency does not exceed 10 cycles per sec for short strokes, dropping to 2.5 cycles at a stroke of 30 ft, it is claimed that resonance with the frequency of chip formation, which would be detrimental to tool life and surface finish, cannot occur; however, entirely conclusive tests on a more scientific basis are still lacking.

In addition, the effect of cutting force variations is considered by the author. The table slows down due to slip in the hydraulic pumps, which increases with the cube of the oil temperature. Comparing various mechanical, electrical and hydraulic drives, it was found that the kinetic energy required for hydraulic drives is only ¼ of that required for a Leonard drive. This substantial difference, it is claimed, is one of the reasons for better surface finish and longer tool life obtained with hydraulically driven planers.

### Electronic Control of Machine Tools

Advantages and drawbacks of electronic control of machine tools are discussed by J. Irtenkauf in *Werkstattstechnik & Maschinenbau*, No. 10, 1952. In a survey of various machine tools of American, German, British, Swiss and French origin, the author comes to the conclusion that an infinitely variable speed drive in grinding machines, standard lathes and milling machines can be attained at less cost by devices and mechanisms other than electronic controls. He figured that about 40 to 60

...t of the price of an electronically ...olled lathe is due to this type of ...ment. Since a constant cutting ...d is of significance only in the case ...laning operations because of the ...gs, he favors electronic devices for ...thes and some vertical boring mills ...ot for other types of machine tools.

### Shell-type Design

Shell-type machine tools are more rigid and tend to vibrate less than conventional machine tools which employ heavy masses for suppressing oscillations. According to W. Moebius in *Zeitschrift des Vereins Deutscher Ingenieure*, September 1, 1952, the principle of shell design has been in use for some time in the aircraft and shipbuilding industries, where strength and lightweight must be combined. The author contends that an egg-shaped outline comes closest to the requirement of high rigidity and low weight. A turret lathe used as an illustration in the article shows how this idea has been applied, and that the appearance of the machine has been improved.

Other topics touched upon in this article which deal with tool engineering problems cover remote control, preselectors, various drive mechanisms. It also shows a foot-controlled, electrically operated chuck made of aluminum with steel inserts. The chuck can be operated only when the machine is not running in order to avoid accidents in the shop.

### Machining of Railroad Wheels

An automatic machine for turning of railroad wheels is discussed by A. Kuhlewind in *Stahl & Eisen*, No. 19, 1952. Four lathes were previously used for the machining of a wheel, requiring one hour per wheel, as against a machining time of only 15 minutes when employing two automatics. They are built like T-lathes, equipped with four slides for the tools and controlled by templets to copy the shape of the wheels. Maximum cutting speed at the periphery of the wheels is 450 fpm. Roughing and finishing is done on the same machine, but not simultaneously in order to avoid the effect of stresses set up in the machines during roughing. Pneumatic loading devices for lifting the wheels into the chuck are provided.

* * *

At the recent convention of the Gray Iron Founders' Society, Inc., H. J. Trenkamp of the Ohio Foundry Co. was elected president for the coming year. Other officers elected include T. I. Curtin, Jr., Waltham Foundry Co., vice-president; C. H. Ker, Dalton Foundries, Inc., secretary; and W. O. Larson, The W. O. Larson Foundry Co., treasurer.


# PROCESS ENGINEERS
# TOOL DESIGNERS
for
*PERMANENT POSITIONS*
with

**IBM**

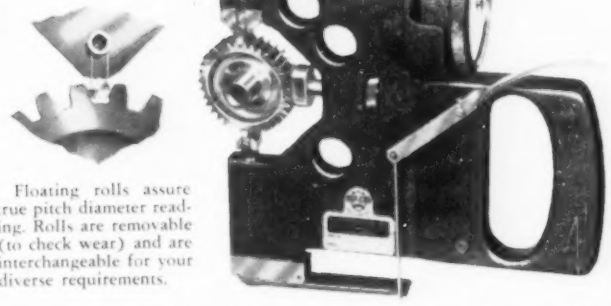
**PROCESS ENGINEERS** for work in Tool Engineering Department. Should be capable of preparing component parts and assembly process sheets for small, intricate parts and mechanisms. Two years' experience desirable.

**TOOL DESIGNERS** for work in Tool Engineering Department. Should have at least two years' experience in layout and design of dies, jigs and fixtures.

Excellent salaries, opportunities, and working conditions; unusual employee benefits; good living conditions; moving expenses paid.

**Write**, giving full details, including experience and training, to: Mr. P. T. Vanness, Personnel Manager, International Business Machines, Poughkeepsie, New York.

**NEW Portable Pitch Diameter Gage**



Floating rolls assure true pitch diameter reading. Rolls are removable (to check wear) and are interchangeable for your diverse requirements.

***checks pitch diameter of gears, splines or any other over-roll measurements.***

Gives instantaneous, accurate reading of the pitch diameter with no effort on the part of the operator. Ideal for quality control. Available in sizes to check pitch diameters from 3/16" to 12" or larger.

We manufacture a complete line of gages such as Dial Bore Gages, Dial Snap Gages, Dial Groove Gages, Dial Groove Location Gages, Dial Shallow Hole Gages and all standard AGD Plug and Ring Gages.

Twenty-five representatives throughout the U.S.A.

*Please ask for catalog P.D.M.*

NILCO

**NILSSON GAGE CO., INC.**
Poughkeepsie, New York

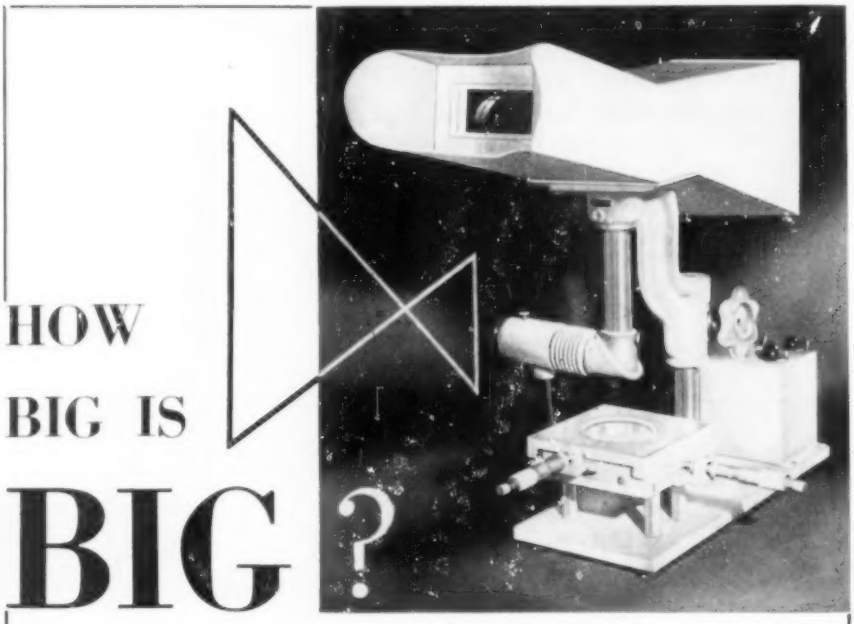
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-135

# North East West South IN INDUSTRY

The **Magnesium Association's** new president is **James S. Kirkpatrick**, elected at the recent meeting of that organization. Mr. Kirkpatrick is director of research and development for Brooks & Perkins, Inc.

**G. Krause** has been appointed chief designer of **Loewy Construction Co.**, subsidiary of **Hydropress, Inc.**, in charge of the USAF Heavy Press Program being carried on there.

The president of **Laars Engineers, Avy Lewis Miller,** has been named head of the multipiece subcommittee of the office of Chief of Ordnance of the Department of the Army. Mr. Miller will be in charge of the national committee that will advise Ordnance on production of multipiece manufacturing equipment as well as finished items. He has just returned from Europe where he conferred with engineers and manufacturers of such items.

HOW BIG IS BIG?

As Big As The Engineering Skill offered by Stocker & Yale.
This Optical Comparator, Small in Size is Serving America's Greatest Industries. 250 Stocker & Yale Projectors check the Quality of General Electric Instruments at their "World Headquarters for Electrical Measurements", West Lynn, Mass. What is your Inspection Problem?

***Write* for Projection Brochure—Contains 10 Application Stories**

Stocker & Yale INCORPORATED
MARBLEHEAD MASSACHUSETTS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-136


**Robert N. Harwood** has been named a vice-president of **Solar Steel Corp.** Mr. Harwood was general manager and a director of Ohio Stainless and Commercial Steel Co. before joining Solar in 1950 where, immediately prior to his present appointment, he served as general manager of the Bar & Tube Div.

Robert Harwood

Harry Day

**Harry Day** has been named vice-president and general manager of **Link Welder Corp.** Mr. Day, who has served Link Welder as chief engineer, plant manager and general manager, had a broad experience in the field with other companies previously, including Wayne Die and Tool and Multi-Hydromatic Welding and Manufacturing Co.

**Robert S. Sweeney** has been named vice-president and general manager of **The Watson-Stillman Co.,** The Hydraulic Press Div. of **H. K. Porter Co., Inc.** He will be in charge of all manufacturing and sales activities of the division. Until his present promotion, he had been vice-president and treasurer.

According to a recent announcement by the board of directors of **The Lincoln Electric Co., J. S. Roscoe** has been appointed executive vice president of the organization in charge of business administration. Mr. Roscoe, who has been with Lincoln since 1924, was formerly director of purchasing. Widely known in the field, he established the procedures for welding the first all-welded freighter on the Great Lakes, and pioneered the application of welding in many industries.

**Wilbert G. Prasse** has been elected to succeed the late George H. Fobian as president of **The Oilgear Co.** Mr. Prasse started to work with Oilgear in the machine assembly department in 1927, later becoming sales representative and general sales manager and seven years ago being made vice-president and director. At the same time, Frank G. Kuhagen was named vice president and director of the company. Mr. Huhagen, who became associated with Oilgear twenty-seven years ago, was formerly sales manager.

harles **R. Crowder** has been elected ... board of directors of **H. K. Por-... Inc.**, manufacturers of metal cut-... tools and equipment. Mr. Crowder ... also executive vice-president and a ... tor of Van Norman Co. as well as a ... ctor of Morse Twist Drill and Ma... Co.

According to a recent announcement, John **F. Newhard** has been appointed production control manager of the **Shakeproof Div.** of **Illinois Tool Works.** Before joining Shakeproof, Mr. Newhard served in production control and planning capacities with A. O. Smith, Highway Trailer Co. and U. S. Steel.

**Ernest W. Marchand** has become vice-president in charge of operations of the **Evans Products Co.** Mr. Marchand comes to Evans from Highway Trailer Co., where he held a similar executive position, following nearly 30 years' experience in the field of plant operation, development and production.

Ernest Marchand

John Kline

**John E. G. Kline** has been promoted to the position of vice-president in charge of process development and patents for **Micromatic Hone Corp.** Mr. Kline began his career in the hone abrading industry with the Hutto Engineering Co. in 1928, and when that company's tool division was absorbed by Micromatic in 1937, he was appointed Micromatic's chief engineer, and later its executive engineer.

At the same time **Douglas T. Peden** was named vice-president in charge of research and experimental for Micromatic. Mr. Peden, who has more than 30 years' experience in machine tool design and development, made his present association in 1938. Both men have originated many patents in the field.

**National Tool & Die Manufacturers Assn.** elected its new officers for the 1952-53 year at its recent annual meeting. **Alfred Reinke,** president of Gus Reinke Machinery & Tool Co., was named president; **Herbert C. Murrer,** president of Murrer Tool Co., Inc., and **Jerome H. Stanek,** vice-president, Stanek Tool and Manufacturing Co., became first and second vice-presidents respectively of the association.

**Warren G. Rosendahl** has been appointed director of manufacturing for the **Columbia Machinery** where he will be responsible for coordinating company manufacturing operations including supervision of the New Products Div. Until recently, Mr. Rosendahl was assistant general manager of the Hamilton Div., Clearing Machine Corp.

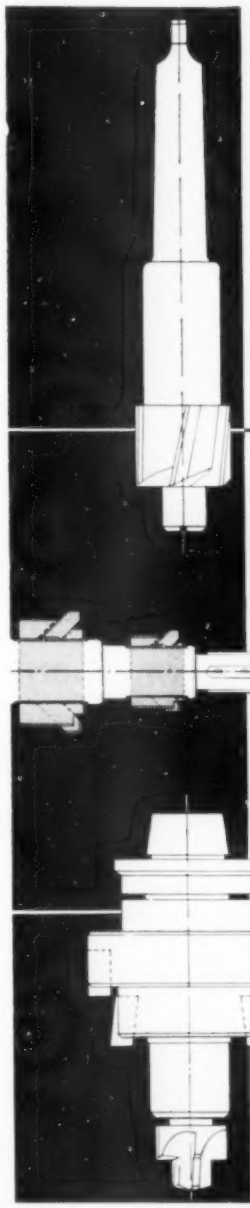
**Paul Porterfield** has been appointed general manager of **The Method X Co.** affiliate of **Firth Sterling, Inc.** Mr. Porterfield, formerly was an electronic engineer for the Chesapeake & Ohio Railroad Co., in charge of their electronic program, succeeds **John S. Roller** who resigned from Method X to take up new duties with Firth Sterling.

## OBITUARIES

**Russell S. Roeller,** general sales manager of **Pennsylvania Salt Manufacturing Co.,** died recently following a brief illness. Mr. Roeller, who was 60 years old, had been associated for more than 30 years with Pennsalt, which he joined as a salesman, later assuming various administrative duties.

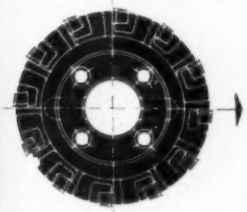
**George H. Fobian,** president of **The Oilgear Co.,** died recently in Milwaukee, Wis.

**Herman Thaler** of **Micromatic Hone Corp.,** died recently. Mr. Thaler was factory manager of the company he had been connected with since 1929.

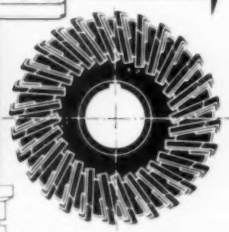
*Ask for the New Standard Tool Catalog and Price List!*

**STANDARD CUTTING TOOLS**
Interchangeable Counterbores and Countersinks in *Economy*, *Quick-Change* and *Heavy-Duty* types . . . with standard, threaded, and full-floating holders. Interchangeable Back Spotfacers and Core Drills . . . Tungsten-Carbide Tipped Counterbores.



**E-Con-O-Mill Standard Milling Cutters**
The same blades and locks fit cutters from 5 to 16" dia., provide savings in tool inventory, grinding costs and machine down-time.

**Standard Block-Type Boring Tools**
For production rough boring, semi-finishing, reaming. Quick-change blocks center automatically, without centralizing screw holes.



**Gair-Lock Fine Tooth Cutters**
Tapered, serrated wedges provide firm hold on inserted blades, require minimum space. Gair-Lock Catalog shows special applications.



**SPECIAL TOOLS**
From small multi-diameter cutters to large-scale tooling programs, Gairing engineers have cut production costs in many leading industries. Gairing representatives are well qualified to discuss any cutting tool problem with you.

**THE GAIRING TOOL COMPANY**
*P. O. Box 478, Roosevelt Park Annex*
**DETROIT 32, MICHIGAN**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-137

# Technical Shorts . .

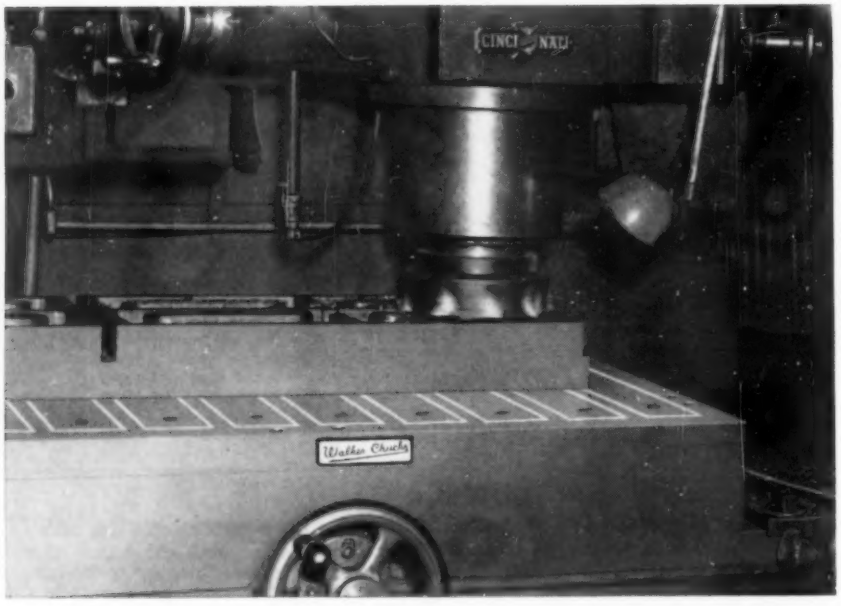
DIFFERENT PLATING baths can make a wide variation in hardness, tensile strength and other properties of nickel deposits. These were the conclusions drawn from a study of the effect of plating variables on the structure and properties of electrodeposited nickel sponsored by the American Electroplaters' Society and carried out by researchers at the National Bureau of Standards. The study also proved that it is possible to explain broad variation in properties on the basis of the physical nature of codeposited impurities present in small amounts. Until now not much information has been available regarding relationship between conditions under which plating is done and the resulting deposit, and the NBS investigation has provided considerable basic data which can be used to insure consistent production of deposits having the desired properties for a given job. In general thinner coatings are used for ornamental purposes or for protection against corrosion; heavier deposits are applied to machine parts where resistance to wear is an important factor, and used in electroforming. Major emphasis was placed on mechanical properties of the deposits which are of immediate value in engineering applications.

During the study, about 240 different deposits were produced from 20 different types of baths operated over a wide range of temperature, current density and pH. The test specimens were obtained by depositing nickel on sheet or tubular cathodes to a thickness of about 0.01 inch. During the plating process, current efficiencies and internal stress of the deposits were measured. After separation from the cathodes, the specimens were analyzed chemically, and their structures were studied by optical microscopy, electron microscopy and X-ray diffraction. They also, were tested for hardness, tensile strength, elongation, yield strength, Young's modulus of elasticity, fatigue limit, internal friction, thermal expansion, specific heat, heat of solution, electrical resistivity and magnetic properties. In addition, the effects of heat treatment on many of these properties were studied.

Plating solution was found to be the most important factor affecting properties of the deposits. Deposits produced at lower temperatures usually were finer grained than those obtained at high temperatures. However, the effects of variations in operating conditions such as temperature and current density were found to be relatively small, assuming conditions were within satisfactory operating range for the solution used.

Physical and mechanical properties of deposits from nickel plating baths are classified in three groups; bright-nickel, containing organic brighteners; high-chloride baths, containing more than 50 percent of the nickel present as chloride; and Watts-type baths, containing nickel in the form of both sulfate and chloride in a 3:1 ratio. The bright nickel deposits yielded by the first bath had greatest hardness, tensile strength, resistivity and coercive force of all types of nickel deposits. Also they had the lowest ductility, elongation and magnetic permeability. The second bath produced dull deposits somewhat below bright nickel in hardness and tensile strength, but possessing a higher ductility. The third type bath obtained dull grey deposits. These were the purest of the three types and possessed the lowest stress, hardness, tensile strength, resistivity and coercive force, yet the highest


*Walker Does It Again—*




Milling machine operating a carbide cutter 660 f.p.m.; table feed 25 i.p.m. on rough steel castings. Walker Magnetic Chuck, securely holding workpiece, increases production equivalent to work of four planers. Take advantage of modern Walker methods for increasing production, reducing cost.

**O. S. WALKER CO. Inc.**
WORCESTER 6, MASSACHUSETTS
*Original Designers and Builders of Magnetic Chucks*

**In Canada — Upton Bradeen & James, Ltd.**

lity, elongation and magnetic permeability.

The pH influence on the mechanical properties of the deposits was second in importance only to the nature of the metal constituents. It was found that when the pH of the bath was above 5, the tensile strength of the deposit steadily rose and ductility decreased. If the pH of the solution was high enough, a noticeable increase in hardness and tensile strength resulted with a decrease in elongation. However, these extreme properties were found to be accompanied by such an increase in stress that the deposits usually cracked spontaneously or exfoliated.

The deposit microstructures show close correlation with the observed properties. In micrographs of nickel deposits from baths of varying chloride content, for example, the most coarse-grained structures contained relatively small amounts of impurities and were soft, ductile and low in tensile strength.

The heat-treatment effects on the mechanical properties were found to be much more pronounced on mechanical properties of bright nickel than those of Watts nickel. Thus, after heat treatment at 400 degrees C, tensile strength of the former fell from about 200,000 psi to about 20,000 psi, while tensile strength of the latter decreased by only 15,000 psi from an initial value of 75,000 psi. Microstructure comparisons generally showed large clean grains in the W deposits on the Watts nickel, and dark areas indicating inclusions or voids in the bright nickel deposits.

Thus, on the basis of data obtained from the study, the varying properties shown by electrodeposited nickel seem determined by the nature of codeposited impurities—small quantities of oxygen, hydrogen, carbon, etc. It is apparent then that it is the small deposits of impurities that the coatings contain that are of value to industry.

* * *

MANUFACTURERS WHO are finding themselves pinched in the industrial diamond shortage and its effect on their cutting operations will be interested in the investigation going on at Carboloy Dept. of General Electric Co. Hope for a greatly lessened dependence on the diamond may well hinge on development of electrical methods for machining and grinding. Several methods for grinding carbide have now advanced to the testing stage. All of these utilize electrical power in one method or another to cut the carbides, according to Kenneth R. Beardslee, general manager of the department. While all the methods do not necessarily eliminate the use of diamonds, those which do not, at least reduce their wear substantially.


DELTA MILWAUKEE QUALITY MAKES THE DIFFERENCE

NOW! 3 Models of

DELTA Drill Units

AIR POWERED–HYDRAULIC CONTROL

**A practical, low-cost way to solve machining problems involving drilling, tapping, reaming, spot facing, hollow milling, chamfering, centering, counter-sinking and the like—Use the Delta Drill Unit to devise special tool set-ups that multiply production, break bottle-necks.**

Rarely has a new machine achieved success so completely and so quickly as this new Delta air-powered hydraulically controlled Drill Unit.

Thousands of manufacturers, on the alert for ways to get better production faster and at least cost, have won astonishing benefits by means of this adaptable unit—by designing special machines for multiple and series operations.

You'll appreciate "Why" when you check these 12 reasons:

1. Quick set-up. No cams used.
2. Rapid approach and return.
3. Length of approach and total stroke positively controlled.
4. Approach repeats to within .010 inch—final depth to within .0005 inch.
5. Power feed hydraulically controlled . . . Independent of motor and spindle speed.
6. Compressed air provides the force on a sealed, pumpless hydraulic system to move spindle forward, completely eliminating lost motion and back lash.
7. Sealed unit construction permits operation in any position.
8. Built-in control switches.
9. Units offered as direct drive, gear drive, or pulley drive.
10. Standard NEMA frame motors.
11. Utter simplicity of operating principle and rugged design insure long, trouble-free service.
12. Operates efficiently at standard plant 80 p.s.i. air pressures.

Three models are now available to meet your specific requirements:

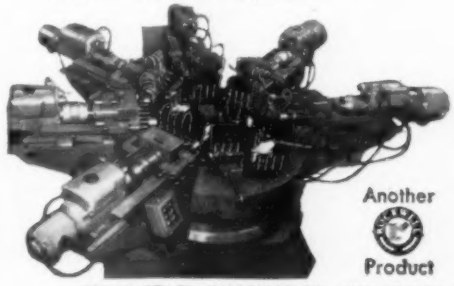
MODEL 19-150 — 1½" stroke. Capacity from No. 80 to 5/16" drill. 4 types of drives.

MODEL 19-400 — 4" stroke. Approximate capacity up to 5/8" drill. 5 types of drives.

MODEL 19-600 — 6" stroke. Approximate capacity 1" drill. 6 types of drives.

See your authorized Delta drill unit dealer —write for the new catalog.

Eight station, semi-automatic drilling machine built for Badger Meter Mfg. Co. of Milwaukee. This machine drills, counter-sinks and counter-bores over 230 parts per hour. Machine has six working stations, a total of 22 spindles producing 5,000 individual operations per hour.



Another Product

DELTA POWER TOOL DIVISION

ROCKWELL MANUFACTURING COMPANY

620A N. Lexington Ave., Pittsburgh 8, Pa.

☐ Please send me catalog AD-723.

☐ Send name of nearest authorized Delta drill unit dealer.

Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____

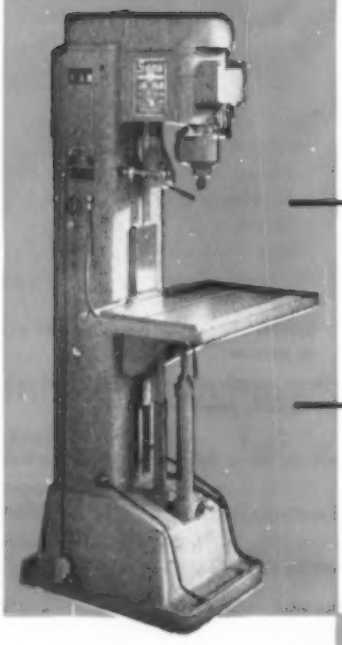
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-130

# Never Before

**SO MANY ADVANTAGES for HIGHEST PRODUCTION**

**4800 PER HOUR!**
**3800 PER HOUR!**
**2500 PER HOUR!**

*For Top Production*



# SNOW

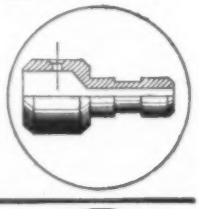
**FULL UNIVERSAL MACHINES**

**Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:**

**DRILLING**

**Crossdrill and C'T" Sink 1/16" Hole**

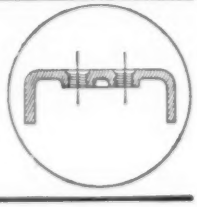
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine



**TAPPING**

**Tap Two #10-32 Holes**

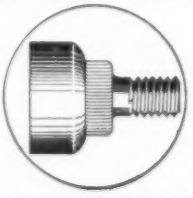
Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine



**THREADING**

**3/8"—24 Thread—1/2" Long**

Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

**SNOW**

**MANUFACTURING COMPANY**

435 Eastern Ave., Bellwood, Illinois (Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

**Submit Sample Parts for Production & Cost Estimates**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-T-140


## Good Reading

A GUIDE TO SIGNIFICANT BOOKS AND PAMPHLETS OF INTEREST TO TOOL ENGINEERS

**MOTION AND TIME STUDY MANUAL,** *by James A. Parton, Jr. Published by Conover-Mast Publications, Inc., New York. 400 pp.*

This book is the product of the author's experience over a period of years in a number of industries, during which time he collected much of the data presented here. He has written this book, not so much from a conviction that industry needs a manual on how to establish a performance standard or to set up standard data, but rather on what should be done with a performance standard or set of standard data after they have been developed.

The first 13 chapters present a program of motion and time study, showing how the factor of time enters into everything with which we are daily concerned, both in industrial as well as domestic activity. The careful and intelligent measurement of time is stressed, and a complete and detailed technique presented for the measurement and recording of that element. The proper method of performance of the operation is discussed, including the presentation of the data to management and labor, and the proper accumulation and filing of the information. Some space is also devoted to the selection and training of personnel.

The second section of the book deals with the application of the performance standards and the standard data, once they have been developed. Cost estimates are discussed and it is shown how the two sets of information referred to are part of the overall picture. Cost control and cost reduction are also included. A final chapter gives some attention to time study by synthesis, with some explanation of the work-factor and methods-time measurement technique.

**SAGA OF THE ABRASIVE INDUSTRY,** *by Muriel F. Collie. Published by The Grinding Wheel Institute and The Abrasive Grain Association, Greendale, Mass. 386 pp.*

Presented here is a chronological history of the development of abrasives and their uses in industry. The first four chapters are devoted to delineating the different kinds of abrasives, both natural and manufactured, and the machines and techniques with which they are used. The book also records the progress in the growth of the two associations which published the volume.

**METHODS OF APPLIED MATHEMATICS**, *by F. B. Hildebrand. Published by Prentice-Hall, Inc., 70 Fifth Ave., N. Y. 11. 523 pp; price, $7.75.*

The aim of this volume is to place at the disposal of the engineer or physicist the basis of an intelligent working knowledge of a number of facts and techniques relating to four fields of mathematics which usually are not treated in texts of the advanced calculus type, but which are useful in varied fields of application. The text includes the results of a series of revisions of material originally prepared in mimeographed form for use in classes at the Massachusetts Institute of Technology.

In order to increase the usefulness of the volume as a basic or supplementary text, and as a reference volume, the author has made an attempt to organize the material so that there is very little essential interdependence among the chapters, and so that considerable flexibility exists in using the book.

In each chapter, the treatment of the subject material shows how typical problems may arise, how those parts of the relevant theory which are of principal practical significance are established, and how techniques are developed for analytical and numerical analysis and problem solving.

**HYDRAULICS AS APPLIED TO THE MACHINE TOOL INDUSTRY**, *published by Vickers, Inc., 1416 Oakman Blvd., Detroit 32. Price $2.00.*

This is one of a series of textbooks prepared by the instructors in the Henry Ford Trade Schools for instruction in hydraulics. It includes information about pumps and valves and their maintenance and repair. It also includes information on the practical applications of hydraulics to machines for the control of feeds and speeds.

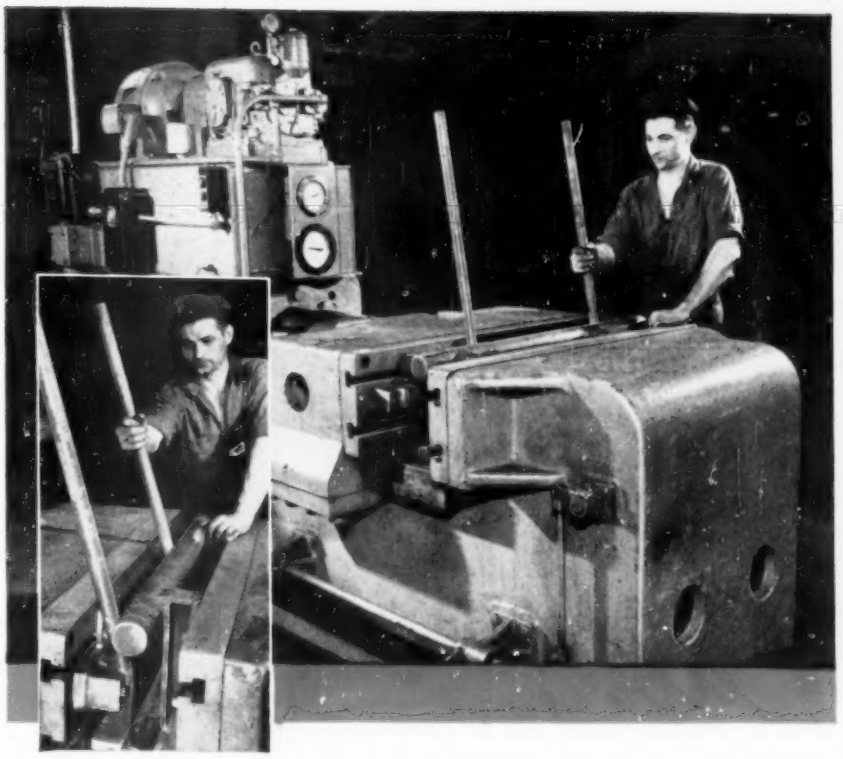
When the Henry Ford Trade School was discontinued, the copyright for this book was assigned to Vickers, Inc., who will revise the book as required by developments in the field.

**BAND TOOL MANUAL**, *published by the DoAll Co., Des Plaines, Ill. 160 pp; price, $2.00.*

This manual is addressed to those men in industry who are tool engineers, supervisors, foremen, and the men who operate the band machines. Its purpose is to present simplified methods for selecting and operating band tools and machines for sawing, slicing, grinding, filing, and polishing all materials.

The book also contains a wide assortment of DoAll band tools for many kinds of jobs and materials, some of them highly specialized.

In addition, the terms and techniques of band sawing with which a band saw operator must be familiar are explained.

**Mercury Mfg. Co. does a better job twice as fast with a**

# FARQUHAR Hydraulic Press

Mercury Manufacturing Co., Chicago, Ill., producers of fork trucks, tractors and trailers, uses a 200-Ton Farquhar Horizontal Bulldozer press to make forgings and stampings and to form plates. In operation 8 hours a day, the press does most jobs twice as fast as the mechanical bulldozer used formerly, and better speed control produces better work.

In addition, many pieces of work that used to be farmed out are now done at Mercury—providing better production and quality control, and effecting additional savings of time.

In the operation shown above, high carbon brazed steel is bent quickly and accurately. In other operations, the press forms heads on bolts, legs for caster forms, and bends structural T frames.

Mercury reports very small maintenance costs, and sums up the company's satisfaction with, "It's the best!"

***Farquhar Presses Cut Your Costs***

Just one more example of cost-cutting Farquhar performance in heavy production! Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost!

Farquhar engineers are ready to help solve whatever production problem you may have. Give them a call.

Send for Free Catalog showing Farquhar Hydraulic Presses in all sizes and capacities for all types of industry. Write to: A. B. Farquhar Co., *Hydraulic Press Dept.*, 1519 Duke St., York, Pa.

*Farquhar*
**HYDRAULIC PRESSES**
for Bending • Forming • Forcing • Straightening • Assembling • Drawing
Extruding • Jogging • Forging • and other Metalworking Operations

**—A. B. FARQUHAR COMPANY Division of THE OLIVER CORPORATION—**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-141

# TRADE LITERATURE

**Free Booklets and Catalogs Currently Offered By Manufacturers**

### Small Tools

Illustrated, 24-page catalog 66-1952 covers company's line of new tools; features accurate diagraming of the tool jaws with true dimensions; contains useful list of decimal equivalents and pertinent data on all Utica tools in many sizes. This catalog replaces the company's current one numbered 63-D. **Utica Drop Forge & Tool Corp.**, Utica 4, N. Y. **L-1-1**

### Steel Tubing

Six-page folder, bulletin No. 10, describes "Patco" steel tubing and cold finished rods and bars; gives manufacturing tolerances and size ranges for standard production; table lists average physical properties of various tubing analyses; also includes list of useful general information for tube users. **Pacific Tube Co.**, 5782 Smithway St., Los Angeles 22. **L-1-2**


*Cut...*

**LARGE HOLES**

**...thru any machineable material up to 1⅛ INCHES thick!**

Here is a premium tool which makes it possible to saw holes in one short operation ... large holes which heretofore had to be laboriously machined "a-chip-at-a-time."

MARVEL High-Speed-Edge Hole Saws have strength to withstand the terrific peripheral strains of heavy duty operation in lathes, drill presses or portable power tools. They have a high speed steel cutting edge which is electrically welded to a tough, alloy steel body, high speed steel pilot drills, heavy hexagonal shanked arbors and sufficient set for deep drilling. They are self-aligning, as the larger diameter saws float on their arbors and are driven by double drive pins. They will saw round holes accurately in any machineable material.

MARVEL High-Speed-Edge Hole Saws come in 35 sizes, from ¾" to 4½". They are carried in stock by leading industrial distributors.

WRITE FOR BULLETIN ST-650

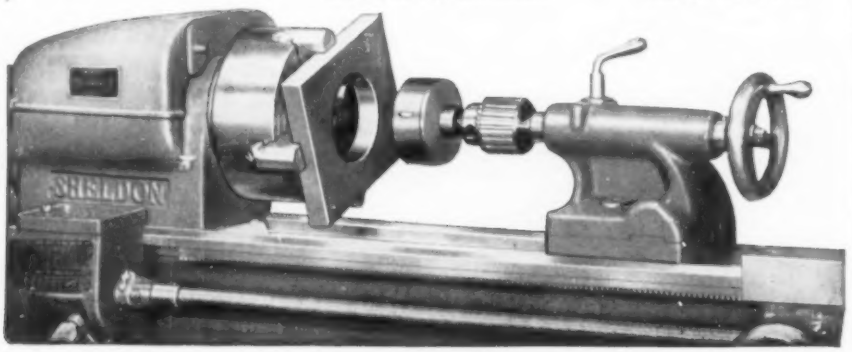
**"MARVEL" *has Always had the edge!***

MARVEL Metal Cutting SAWS

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Avenue Chicago 39, U. S. A.




FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-143


### Circuit Breakers

Manual 101, "What You Should Know About Circuit Breakers," explains operating principles of basic circuit breaker designs and provides engineering data on factors of application; also contains simplified diagrams of three basic types generally used; colored charts and diagrams give details of temperature factors, inrush current effects, tripping and reset time and other facts. **Heinemann Electric Co.**, 517 Plum St., Trenton 2, N. J. **L-1-3**

### Machine and Cutting Tools

General catalog 27312 shows virtually all company's products in condensed form; helpful information to aid in checking basic machine specifications and product descriptions. Also gives information of additional literature for more complete data of particular equipment. **Ex-Cell-O Corp.**, Detroit 32. **L-1-4**

### Retaining Rings

Fifty-two page catalog contains engineering specifications, data and other pertinent information on 17 different sizes of retaining rings; aimed at helping users select proper rings and use them to best advantage; graphically illustrates typical cost-cutting applications. Assembly and accessory tools designed to handle retaining rings on a speedy production line basis also covered. Truarc Catalog Service, Dept. 031, **Waldes Kohinoor, Inc.**, 47-16 Austel Place, Long Island City 1, N. Y. **L-1-5**

### Grinding Wheels

"A New Concept in Grinding Wheels" presents research data together with photomicrographs on the technical aspect of grinding and resultant chips. In addition, picture story tells how Cincinnati grinding wheels are made. Cincinnati Milling Products Div., **The Cincinnati Milling Machine Co.**, Cincinnati 9. **L-1-6**

### Measuring Instrument

Factual information about "ElectroniK," non-control precision instruments for measuring temperature, flow, pH or other variables, presented in catalog 1520 designed as handbook for engineers and buyers. Includes specifications for each model in addition to information on specially adapted instruments. Well illustrated. Brown Instruments Div., **Minneapolis Honeywell Regulator Co.**, Wayne and Windrim Aves., Philadelphia 44. **L-1-7**

### Material Handling

Comprehensive survey on materials handling offered to users of materials handling equipment who are interested in cost and efficiency improvements; includes check list for evaluating present operations and personnel activities affected. Discusses basic thories and equipment as well as the more comprehensive aspects of the subject. **Wheeler-Brady, Inc.**, 15017 Detroit Ave., Cleveland 7. **L-1-8**

### Carbide Products

Seventy-two page general catalog, 52-G, covers full line of company's tungsten carbide products including cutting tools, draw dies, bushings, diamond wheels and wheel dressers, etc.; also contains extensive engineering data on speeds and feeds, brazing and grinding instructions, grinding wheel recommendations and other pertinent topics. **Metal Carbides Corp.**, Youngstown, Ohio. **L-1-9**

### Measurement

Simplified, compact "Measuray," non-contact X-ray gage for continuous or intermittent measurement of strip or sheet stock while in motion or stationary, is described and illustrated in catalog which explains its operation and advantages. **The Sheffield Corp.**, Measuray Sales Div., Dayton 1, Ohio. **L-1-10**

### Hydraulic and Hand Tools

The "Blackhawk Idea Book," No. 352, presents 1001 shortcuts with hydraulic tools and hand tools for industrial, construction, electrical and other fields; well illustrated, it shows as well as describes the tools in action in production, maintenance and testing. **Blackhawk Manufacturing Co.**, Milwaukee 1, Wis. **L-1-11**

### Carbide Tools

Form 52-817 deals with single-point brazed-on carbide cutting tools and carbide tips and blanks; handy comparison charts list DoAll grades of carbide and show comparable grades distributed by other manufacturers, with applications indicated for the various grades. Section on tips and blanks includes discussions of both unground and preformed types as well as information concerning proper use of these tools. **The DoAll Co.**, Des Plaines, Ill. **L-1-12**

### Sheet Materials Handling

Pamphlet covers recently patented Stripveyor and Liftveyor materials handling equipment for sheet stock, stressing cost and time economy as well as safety; includes full operating data; widely illustrated with photos and diagrams. **Fried Steel Equipment Mfg. Corp.**, 528 E. 119th St., New York 35. **L-1-13**

### Lathe, Automatic

Illustrated brochure, Form 1159, deals with latest model of Gisholt's "Simplimatic" automatic lathe line; covers both the machine itself and 31 of its tooled applications. **Gisholt Machine Co.**, Madison 10, Wis. **L-1-14**

### Marking Tools

More than 100 different marking tools and devices described and illustrated in 28-page catalog; also offers information on specially-developed alloy, Mecco Safety Steel, which is used for most products in the line. Catalog No. 100. **M. E. Cunningham Co.**, 1034 Chateau St., Pittsburgh 33. **L-1-15**

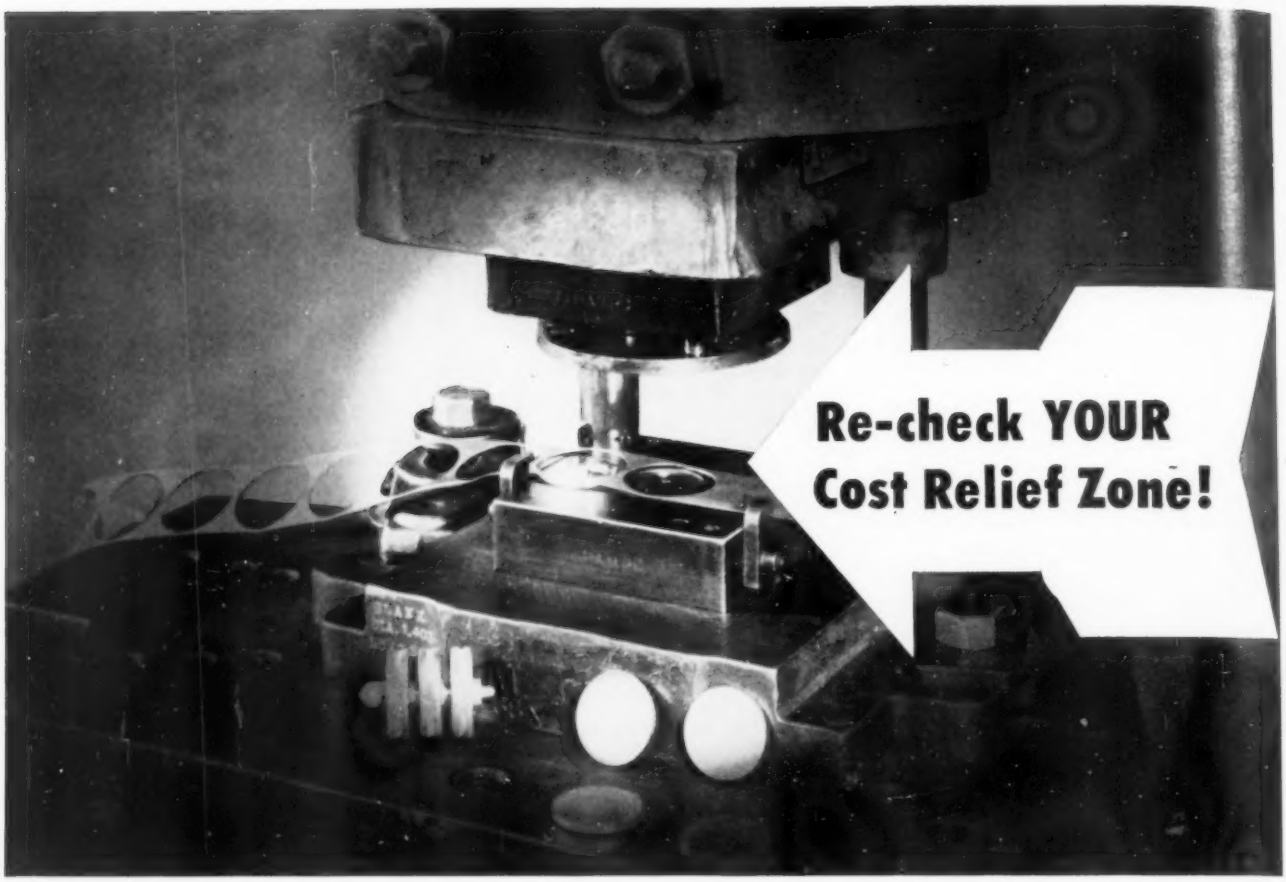
### Screw Calculator

Slide-rule type plastic guide for selecting correct size socket screw; shows all dimensions for standard screws of given diameter, threads per inch, proper tap drill size, body drill and counterbore sizes for each diameter. **Standard Pressed Steel Co.**, Box No. 786, Jenkintown, Pa. **L-1-16**

### Cutting Tools

Forty-eight page catalog covers company's complete line of cutting tools, including taps, dies, twist drills, counterbores, keyway broaches and tap and die kits. **Threadwell Tap & Die Co.**, Greenfield, Mass. **L-1-17**


FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-143




***Here's a Challenging Opportunity for Every Man Responsible for Tooling and Production***

Your *tools* and *dies* represent an immediate opportunity to bring unit costs down to a reasonable level. A quick re-check of this vital cost zone can result in definite savings. Sometimes these savings show up in less die finishing or adjusting. Or in longer runs with less downtime for regrinding. Many times they come about through a drastic reduction in the *number* of tools and dies you make each year.

Actual job records in plant after plant *prove* these cost economies can be realized. A good example is the job shown above. A re-check of these dies, used to blank and form .008" thick bronze thermostat diaphragms, showed that a different steel with better wearing qualities was needed to reduce excessive downtime for regrinding. This steel, Carpenter Hampden (Oil-Wear), eliminated *11* hours of machine downtime each week and produced over a half-million *extra* diaphragms per grind!

Certainly, if other plants are finding new output and production savings by re-checking their tools and dies, you can too. First step is to use The Carpenter Matched Set Method to select the one steel best suited for your job. By so doing, you back your selection with really dependable Carpenter Matched Tool and Die Steels. Then a call to your nearest Carpenter Mill-Branch Warehouse or Distributor brings fast delivery from stock. THE CARPENTER STEEL COMPANY, 154 W. BERN ST., READING, PA.

**Are You Missing These Opportunities In *Your* Cost Relief Zone?**

- Less die finishing and adjusting
- Greater output between grinds
- Fewer heat treating failures
- Less machine downtime

**On Job After Job Carpenter Matched Tool and Die Steels Have Made Them Possible!**

*Carpenter* STEEL

**Matched Tool and Die Steels**

Export Department: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

*Mill-Branch Warehouses and Distributors in Principal Cities Throughout the U. S. A. and Canada*

# Baush Automatic Transfer Lineups Simplify Multi-Spindle Operations...


*Overall view of twin Baush 10-Station Transfer Lineups*

With this Baush 10-Station Automatic Transfer, 116 holes, ranging from 3/16" to 2" diam., are drilled on top and bank faces of the V-8 cylinder block of a popular automobile.

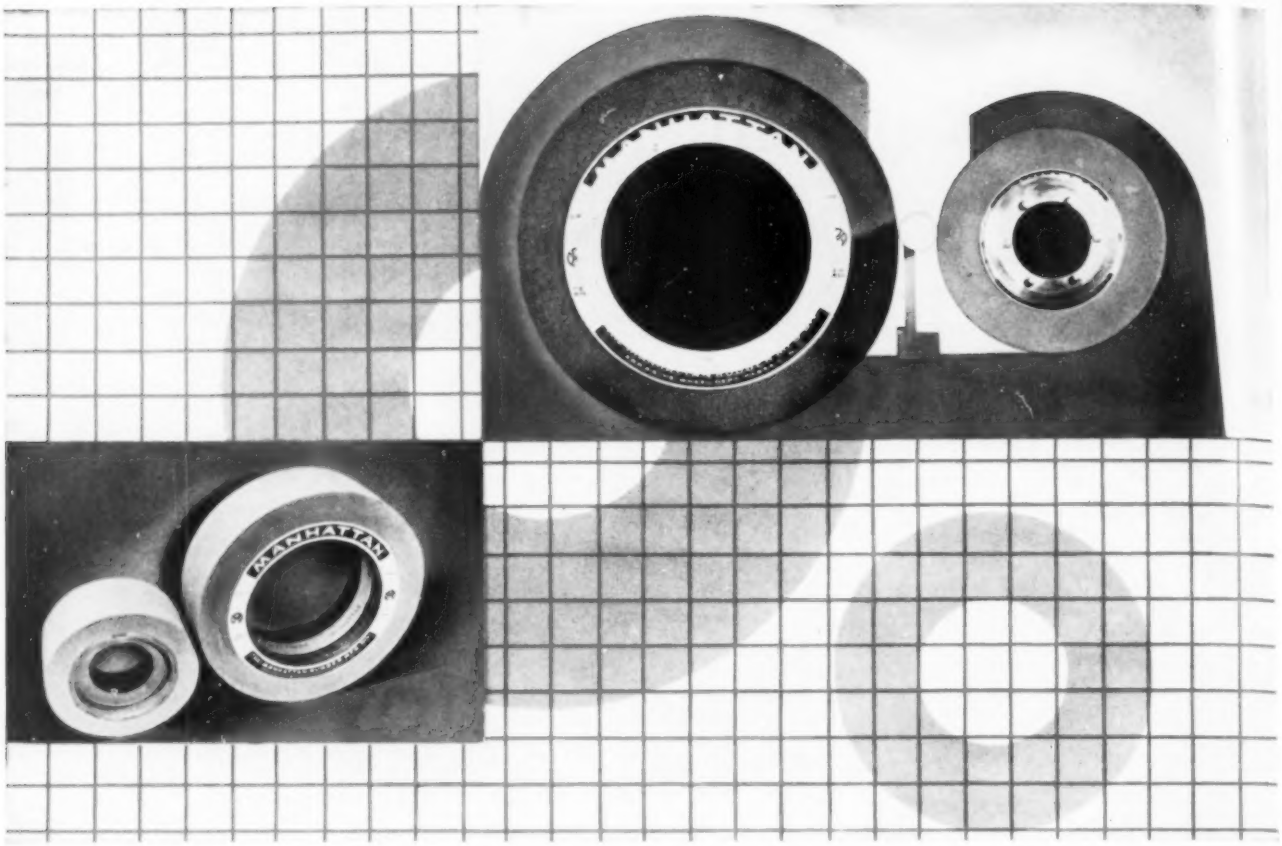
20 of these holes are drilled — sixteen are counterbored, and 20 are chamfered. In all there are 172 operations performed automatically by this one lineup.

## SPECIAL FEATURES . . . EXCLUSIVELY BAUSH!

1. Each machine individual.
2. Accurate leveling of one machine to another is unnecessary.
3. Each machine has own electrical controls.
4. Each machine has built-in low pressure hydraulic transfer.
5. Each machine has constant-pressure hydraulic cam clamping.
6. One or more units can be added to lineup for added operations.
7. Exceptionally flexible — 2 lineups can be operated as one.
8. Construction is exceptionally heavy and rugged.
9. Line can be broken to add roll-over fixture to clear chips, automatic indexing, or checking fixture, even after machine has been installed.
10. Years of design experience gives maximum production with minimum maintenance.

**BAUSH**
**MACHINE TOOL CO.**
**SPRINGFIELD 7, MASSACHUSETTS**

Our many years of designing special automatic multi-spindle machines is yours to use at any time — just drop us a line — tell us your problem, and Baush Engineers are at your service.




# MANHATTAN CENTERLESS WHEELS

## custom-made for faster production

The surest way to get more metal removal per pass is to have the abrasive and bond custom-tailored to the work you are doing. That's how Manhattan Centerless Wheels are made — to *your* order. In addition, Manhattan Centerless Wheels perform two operations — roughing and finishing — without necessity of changing wheels. Higher metal removal, longer wheel life, and savings in centerless wheel inventory add up to a substantial economy in your production costs — worth looking into!

Manhattan Regulating Wheels are supplied either plain or core-mounted at additional worthwhile savings.

GRINDING WHEEL INSTITUTE MEMBER

**WRITE TO ABRASIVE WHEEL DEPARTMENT**

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

**RAYBESTOS-MANHATTAN, INC.**


Flat Belts


V-Belts


Conveyor Belts


Hose


Roll Covering


Tank Lining


Abrasive Wheels

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks • Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls

MR-825

**Designed and manufactured by the Netherlands Arsenal at Hembrug, Holland... one of Europe's most modern plants.**

ARTILLERIE-INRICHTINGEN

# High Quality Super Precision MACHINE TOOLS

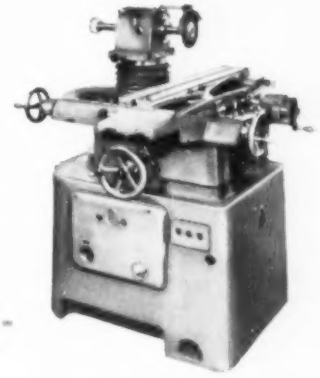
## UNIVERSAL TOOL & CUTTER GRINDER

The AI Model U. I. is specially built for those industries where the demand is for constant accuracy and high precision grinding of cutting tools and for general toolroom work. Ideal for cutters, mills and reamers. Particularly suitable for cylindrical, surface and internal tool room grinding.

**MAIN SPECIFICATIONS**

| | |
|---|---|
| Table size .....35½"x5⅛" | Distance between plain centers .....27½" |
| Table travel, longitudinal .....16⅛" | Swing on plain centers ..... 11" |
| Saddle travel, cross ..... 8⅝" | Wheel speeds ..... 3000/6000 r.p.m. |
| Wheel head travel, vertical .....10½" | |

Attachments available for Heavy Duty Cylindrical, Internal, Radius, Long Reamer and Universal Hob Grinding.



U. I.

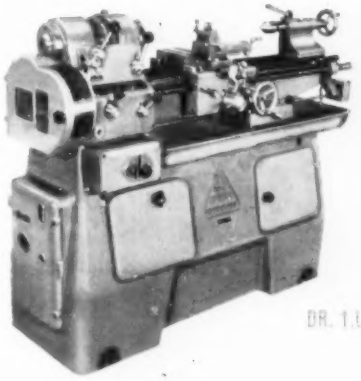
## PRECISION TOOLMAKERS LATHE

The AI Model DR. I. L. meets the most exacting requirements of the toolroom for lasting accuracy, precision and efficient production.

**MAIN SPECIFICATIONS**

| | |
|---|---|
| Swing over ways .....10⅝" | Sixteen spindle speeds ....45—2200 r.p.m. |
| Swing over cross slide ..... 5⅝" | Longitudinal carriage feed .0009"—.100" |
| Distance between centers ..... 30" | Automatic cross feeds .... .0003"—.033" |
| Hole in spindle ..... 1" | Main motor, two speed....1 and 1½ H.P. |
| Quick change gear box will cut 2—90 pi. | |

Attachments available for Coolant, Universal Indexing, Fast Thread Cutting, Taper Turning, Hydraulic Copying, etc.



DR. I. L.

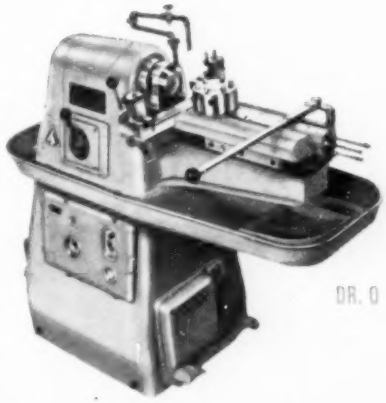
## HIGH SPEED PRODUCTION LATHE

The AI Model DR.O. is a hand operated screw machine for bar work up to ¾" diameter and a second operation lathe for finishing small work pieces. The roller turret slide construction assures a sensitive, accurate operation.

**MAIN SPECIFICATIONS**

| | |
|---|---|
| Hole through spindle .....25/32" | Effective stroke of turret slide ..... 4" |
| Maximum capacity push type collets .....⅞" dia. | Number of spindle speeds, forward and reverse ..... 12 |
| Swing over, ways .....10½" | Range of spindle speeds 335 to 5300 r.p.m. |
| Swing over cross slide ..... 7⅛" | Main motor, |
| Cross travel of compound rest ..... 4" | three speeds.....1, 1¾ and 2½ H.P. |
| Maximum distance face of spindle to face of turret ..... 9" | |

Attachments available for Bar Work, Pneumatic Foot Control for High Production, Coolant, etc.



DR. O

All machines equipped with graduations and electrical controls to fit American requirements. Service and replacement parts for all machines.

***Write—Wire—Phone for catalogs, prices and demonstration at our showrooms.***

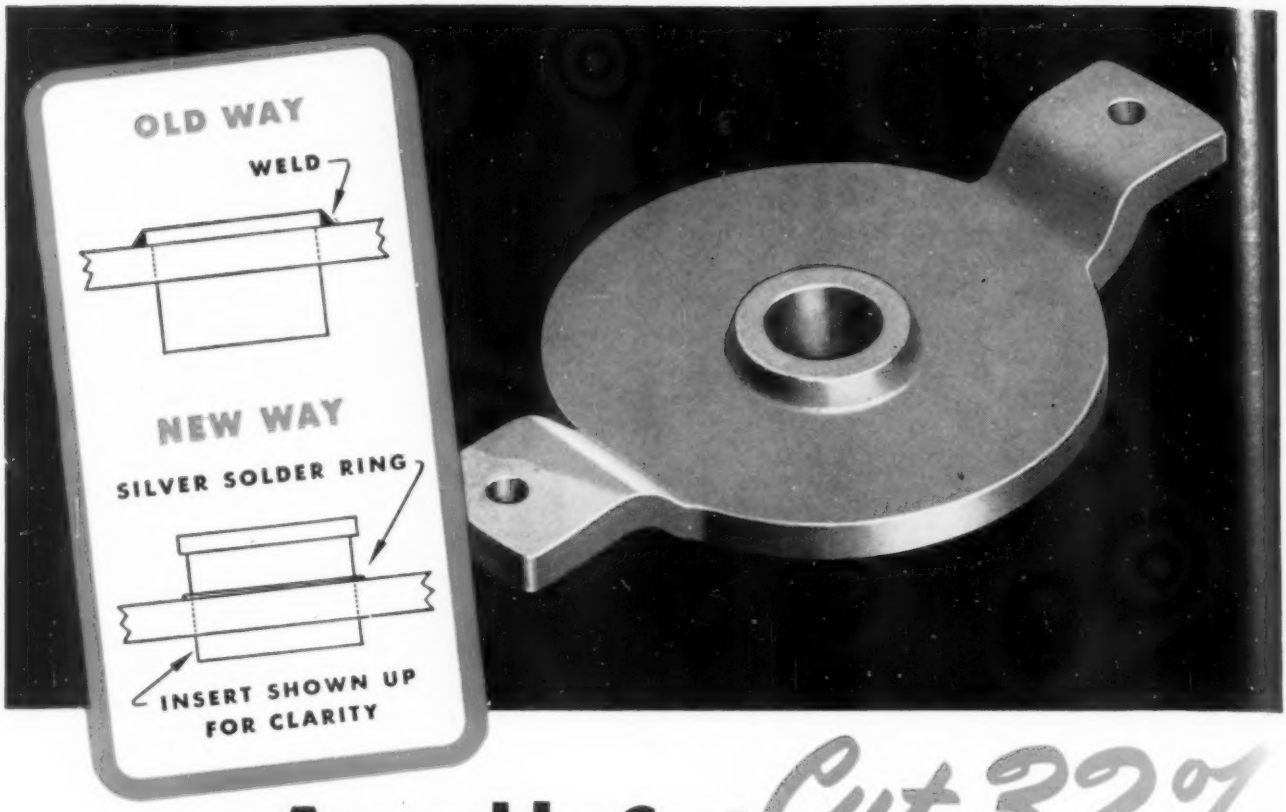
***Exclusive Importers for the U.S.A. and Canada:***

**AMLINTOOL, Inc.**

OFFICES AND SHOWROOMS: 20 BECKLEY AVENUE, STAMFORD, CONN.

*SALES TERRITORIES OPEN*

**PROMPT DELIVERY NO PRIORITY REQUIRED**




# Assembly Cost Cut 32% with TOCCO* Induction Brazing

## *Now's the time to balance YOUR production budget*

This assembly may bear no resemblance to your product, but its case is typical of the savings accomplished by Induction Heating of metal parts of all sizes and shapes.

Formerly the Norris Thermador Corporation used arc welding to join the bushing and clamp shown above. In an effort to reduce costs TOCCO Induction Heating was brought into the production picture with the following results:

| **OLD METHOD** (Arc Welding) | | **NEW METHOD** (TOCCO Induction Brazing) | |
|---|---|---|---|
| Material (rod) | $ 4.56 per M parts | Material (solder and flux) | $13.83 per M parts |
| Labor | 20.63 per M parts | Labor | 8.82 per M parts |
| Overhead | 21.25 per M parts | Overhead | 9.08 per M parts |
| Total Cost Old Method | $46.44 per M parts | Total Cost TOCCO Method | $31.73 per M parts |

*TOCCO Engineers are glad to survey your operations for similar cost-cutting results — no obligation, of course.*

**THE OHIO CRANKSHAFT COMPANY**


TOCCO

*Trade Mark Reg. U. S. Pat. Off.

Mail Coupon Today

NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. G-1, Cleveland 1, Ohio

Please send copy of "Typical Results of TOCCO Induction Brazing and Soldering."

Name_____

Position_____

Company_____

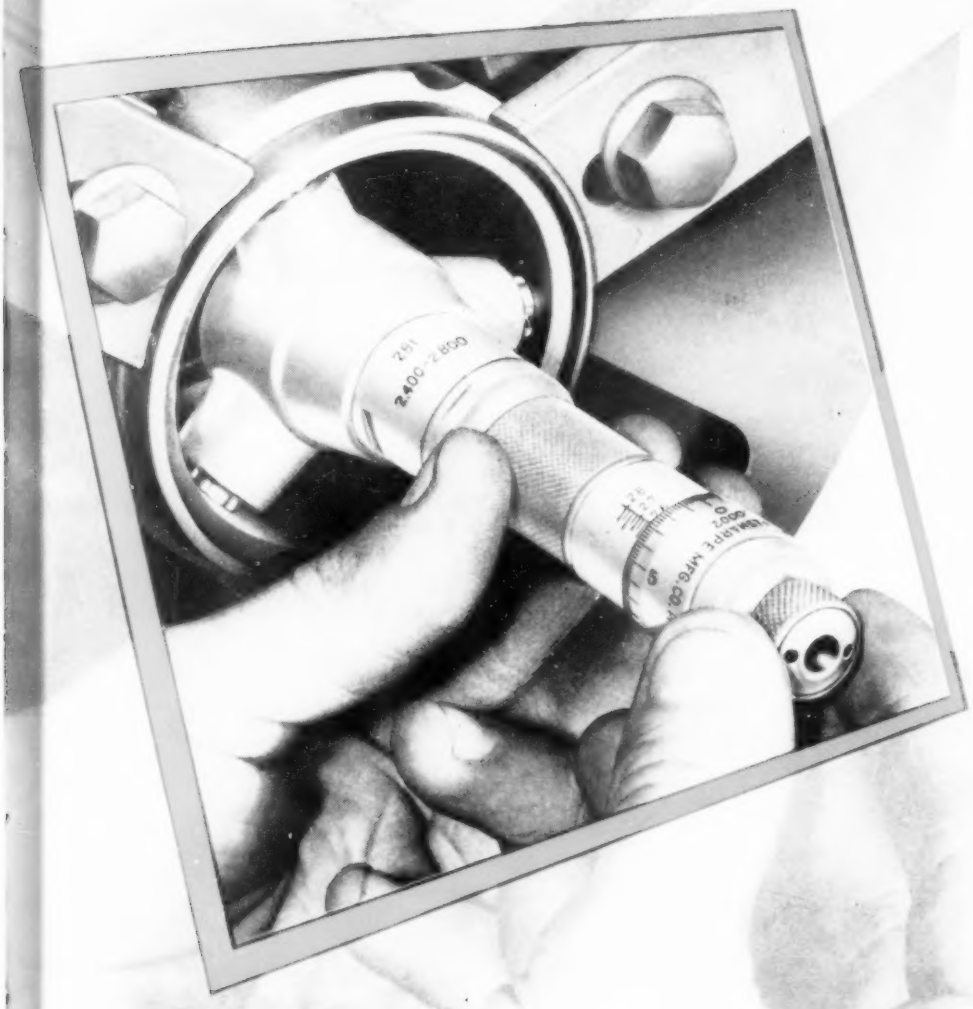
Address_____

City_____ Zone___ State_____

B·S **Productioneered**

**For Low-Cost Direct Measuring of Bores and Holes**

# New INTRIMIK
## Internal Tri-Point Micrometer



Now you can realize new economies and speed by measuring bores and holes with the Brown & Sharpe Intrimik. It's a precision micrometer . . . not a comparator. Takes measurements directly. Intrimik eliminates the need for many expensive plugs and setting rings . . . it is "Productioneered" to cut costs and speedup machining of work requiring inside measurements. Every feature for convenience, precision, and long service life has been incorporated in its design and construction.

- As easy to read as a conventional micrometer . . . measures bore or hole size accurately, disclosing exact amount of metal to be removed.
- Ratchet stop provides correct and unvarying measuring pressure.
- Self-aligning, axially and radially . . . three active measuring points automatically centralize tool in bore.
- Extremely rigid . . . no interchanging of parts (except for extensions).

*SEE NEXT PAGE FOR RANGE OF SIZES*

**Brown & Sharpe**

# B·S Productioneered

to measure ANY size bore or hole within range of tool . . .

## New INTRIMIK

## Internal Tri-Point Micrometer

The Brown & Sharpe Intrimik gives you a handy means of measuring inside diameters in increments of .0001" on bore sizes from .275" to .500"; and in increments of .0002" on bore sizes from .500" to 4.000". Where measurements must be taken over a range of sizes, Intrimik offers tremendous savings over plug and comparator type gages.

### *WIDE RANGE OF SIZES*

Intrimik is furnished in 16 individual sizes, and also in four sets to cover all measurements from .275" to 4.000". Measurements at depths of 2" can be made with the three smaller sizes, and 3" with the larger sizes. Extensions are available to measure at depths up to 6" with the smaller sizes, and up to 9" with the larger. For even greater depths, two extensions may be used.

Write for the illustrated Bulletin describing the new Intrimik.

Intrimik with single extension for measuring deep holes.

*WE URGE BUYING THROUGH THE DISTRIBUTOR*

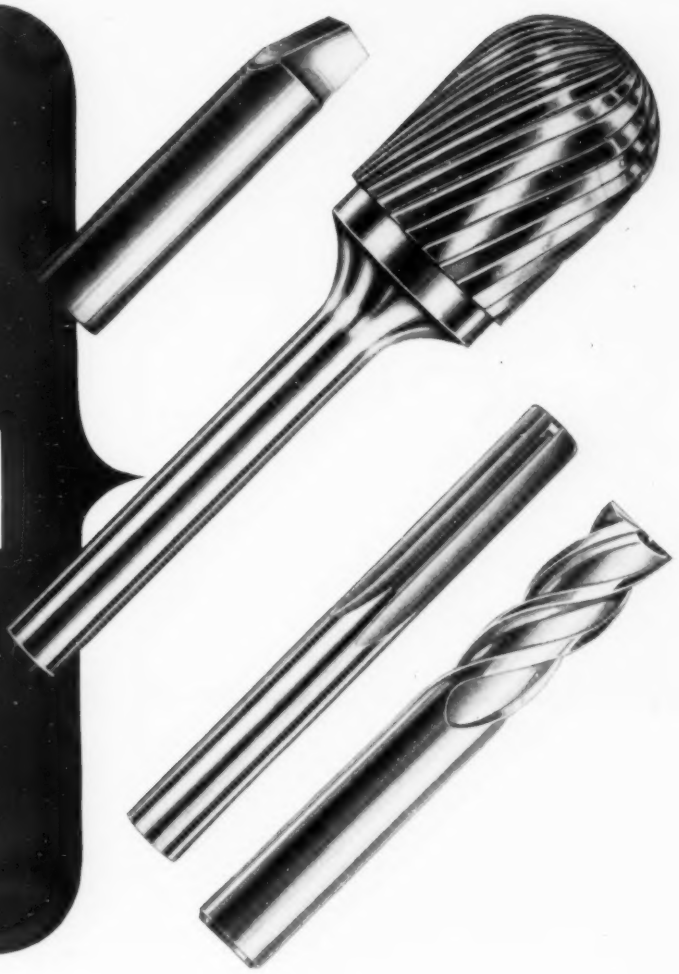
**Brown & Sharpe** B·S

**BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U. S. A.**

PRINTED IN U. S. A.

Milling Machines • Grinding Machines
Screw Machines • Machine Tool Accessories
Cutters • Machinists' Tools
Electronic Measuring Equipment
Johansson Gage Blocks
Permanent Magnet Chucks • Pumps

# They're TUNGSTEN CARBIDE



## They're PRECISION GROUND-FROM-THE-SOLID

*Quality Engineered*

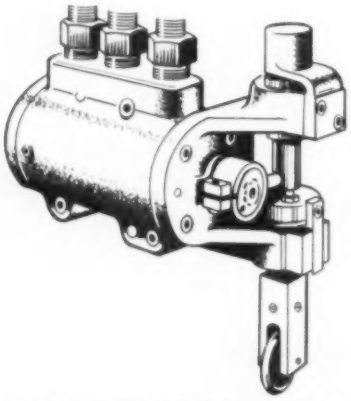
BURS, REAMERS, END MILLS
BORING BITS & TOOLS
AND OTHERS BY ATRAX

# THE ATRAX COMPANY

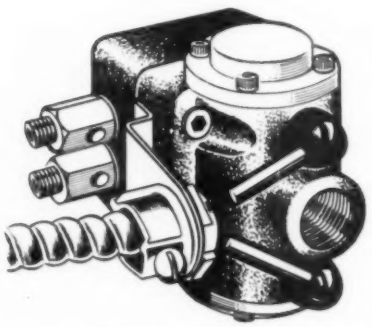
Write for our complete catalog *NOW!*


NEWINGTON IN CONNECTICUT

UNBRAKO SOCKET CAP SCREWS have knurled heads for sure grip and fast assembly; accurate hex sockets for positive, nonslip internal wrenching; fully formed threads, Class 3 fit. They are made of heat treated alloy steel, with controlled fillet and continuous grain flow, for strength; and are available in standard sizes from #4 to 1" in a full range of lengths.



USE UNBRAKO SOCKET CAP SCREWS for compact designs to save space, weight and material on machine tools and metalworking equipment.



On textile machines, automotive equipment, electrical and electronic devices, and production machinery.

# Do you really need a special UNBRAKO?

Before you specify a special socket screw, check UNBRAKO Standards. A standard UNBRAKO will do the same job much cheaper in most cases. You'll get better service and faster deliveries, because UNBRAKO socket screw products are stocked by your industrial distributor. Write for UNBRAKO Standards. SPS, Jenkintown 37, Pa.

**UNBRAKO®** SOCKET SCREW DIVISION

**SPS**
JENKINTOWN PENNSYLVANIA


On precision instruments, dies, jigs and fixtures, and many other applications too numerous to mention.


UNBRAKO Standards—as listed in the SPS Catalog—are stocked by leading industrial distributors everywhere.

# DO YOU NEED

## Surface Grinding to Gage Tolerance?

## Dependable Grinding Performance in Production?

**. . . if so, Boyar-Schultz No. 6-12 is the Surface Grinder for YOU!**

It has the capacity to handle the biggest part of the tough assignments encountered in any shop. It has the accuracy to obtain the high precision needed in tool and gage making. In production it proves so sturdy that long runs, with accuracy, are no problem.

The Boyar-Schultz No. 6-12 Surface Grinder is very much in demand in our own shop! Our mechanics *know* its built-in qualities . . . they like to use it.

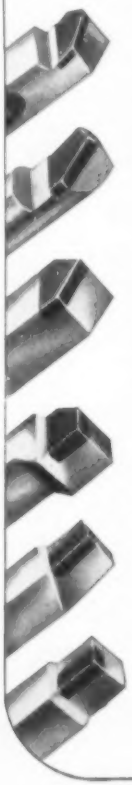
***BIG MACHINE PERFORMANCE—Small Machine Cost***

**BOYAR-SCHULTZ CORPORATION**

2105 WALNUT STREET • CHICAGO 12

USE READER SERVICE CARD: INDICATE A-1-154-1

## A FEW "POINTS" TO REMEMBER



When in need of the best in Carbide tools remember to specify "NORTH-WEST"!


▲ Consistent performance regrind after regrind!

▲ LOOK for this mark of quality

Full-size tips, uniformly brazed, have diamond ground cutting edges. "North-West" tools are tipped with Carboloy cemented Carbide.

Many of your requirements can be met by altering standard tools from stock!

Precision built, flat, single point, carbide cutting tools.

Carbide cutting tools made to your own specifications.

A complete line of Standard Carbide cutting, turning and boring tools. Available immediately from stock.

Distributors in all leading cities.

*Write for catalog.*

**THE NORTH-WEST TOOL COMPANY**

10 North Kilmer St., Dayton 7, Ohio

USE READER SERVICE CARD; INDICATE A-1-154-2

# Fellows

**MACHINES and TOOLS**

FELLOWS

FOR CUTTING
. . . SHAVING
. . . BURNISHING
AND INSPECTION

**in GEAR PRODUCTION**

THE FELLOWS GEAR SHAPER COMPANY, SPRINGFIELD, VERMONT

USE READER SERVICE CARD; INDICATE A-1-154-3


*Empire* LIVE CENTERS

• ACCURATE • VERSATILE • HEAVY DUTY

Manufactured in all tapers. 1 to 6 MT in stock. Special shanks and points made to order.

Points illustrated are standard.

Ask your Supplier or Write for Literature.

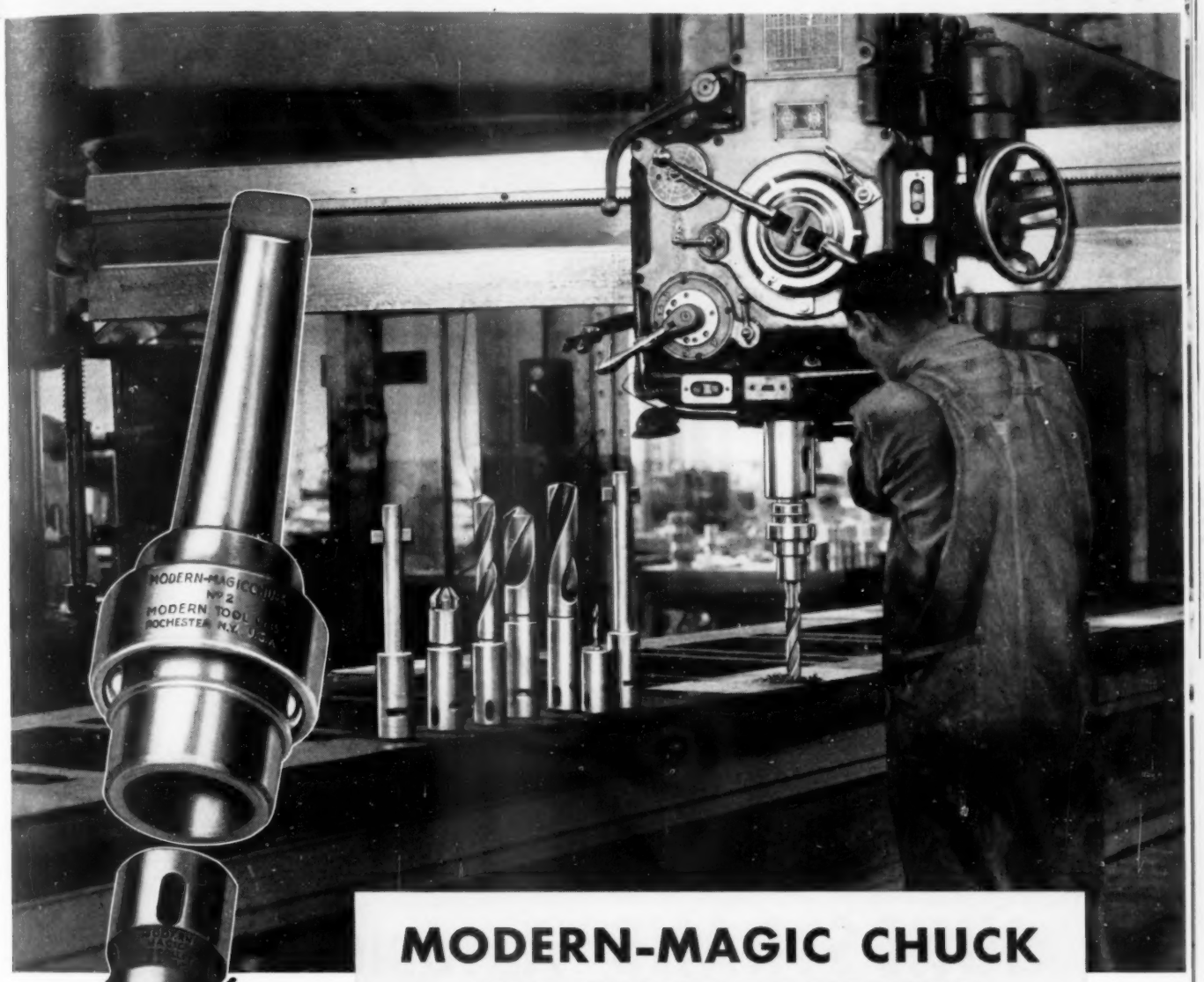
**ROYAL PRODUCTS**

90 UNION ST. MINEOLA, N. Y.

USE READER SERVICE CARD; INDICATE A-1-154-4

# KEEP YOUR MACHINES RUNNING...

## DON'T STOP SPINDLES TO CHANGE TOOLS




## MODERN-MAGIC CHUCK
## AND COLLET EQUIPMENT

Increase your production through elimination of spindle stoppage for tool change. With Modern-Magic Chuck and Collet equipment, tools are quickly and easily changed as the spindle revolves at operating speed. Simple, advanced design makes Modern-Magic Chucks and Collets practically trouble-free. Sturdy, fool-proof construction insures longer accurate service. Your copy of Bulletin M-103 giving full information will be sent upon request. Today?

**Only the ORIGINAL Modern-Magic Chuck and Collet Equipment carry the name "MODERN-MAGIC" and are manufactured by Modern Tool Works, Rochester, N.Y.**

# MODERN TOOL WORKS

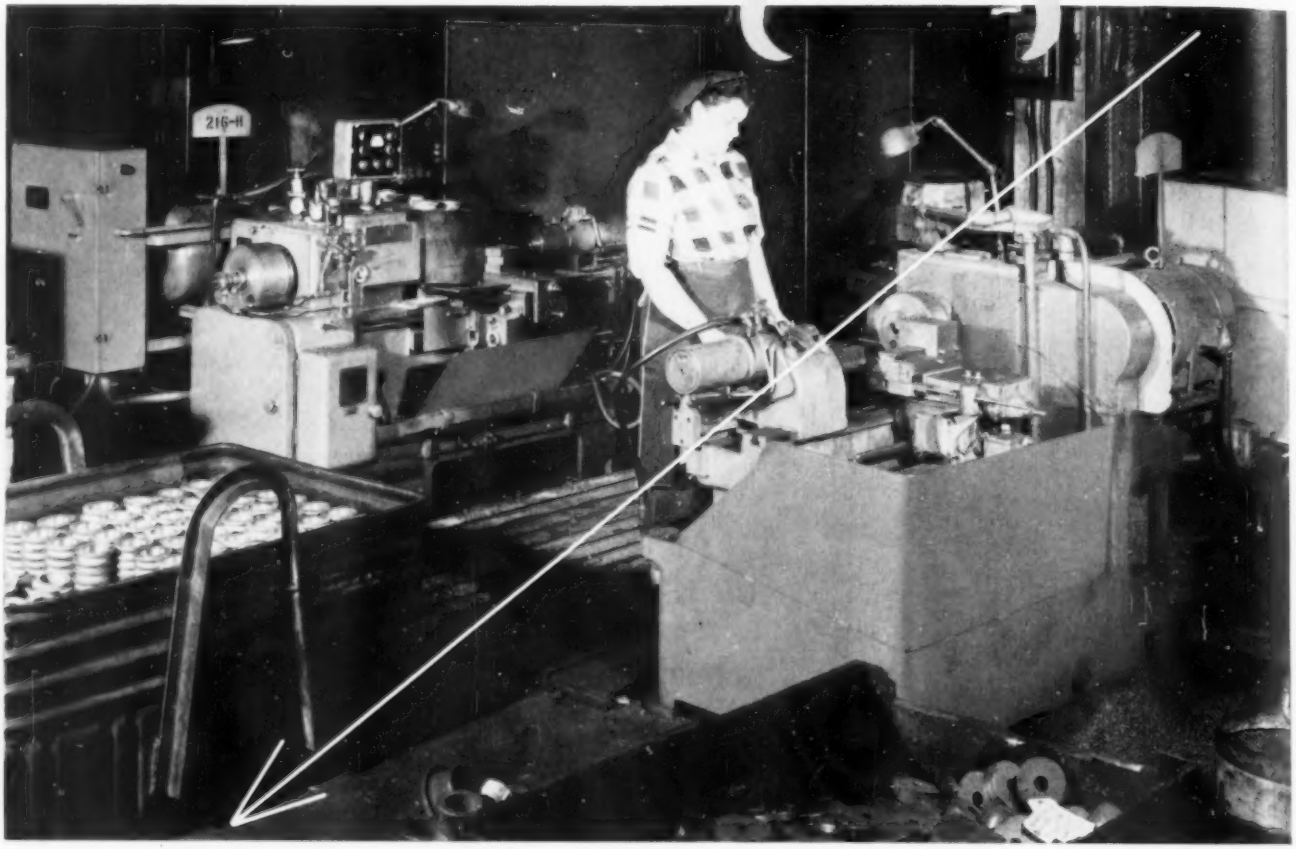
DIVISION

**CONSOLIDATED MACHINE TOOL CORPORATION**

SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

**ROCHESTER, NEW YORK**

# Production Increased from { 4 to 32 / 18 to 65 / 40 to 150 } parts per hour




# on SUNDSTRAND Automatic Lathes

These are only three of the production figures from 17 different parts turned on two Sundstrand Automatic Lathes, part of a modern turning installation. Lot sizes vary from 150 to 200 pieces. Parts are of cast iron and steel and are used in production of heavy machinery. All jobs have a better than 2 to 1 production increase over former method.

### One Operator Handles 2 Machines

The units in this battery of Automatic Lathes are installed with facing fronts, as shown in the above illustration. Because of the simplicity of operation, one operator can easily run two machines. If you have turning problems in your plant call in a Sundstrand Methods Engineer. There is no obligation for this service.

SUNDSTRAND

RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

# Design Features of Sundstrand Automatic Lathes that make this production possible . . .

**Greater Horsepower** All new Sundstrand Automatic Lathes have been redesigned for greater rigidity and larger spindle drive motors. They have ample power for use of carbide cutting tools and are capable of doing more work.

**Wider Speed Range** Spindle speed range ratios have been increased to 30 to 1 to obtain maximum in cutting efficiency over a wider range of sizes of parts and material. The spindle unit is equipped with two driving gear centers, which increase the range between high and low spindle speeds. In addition, four speed changes can be obtained from one set of gears instead of the usual two.

**Wider Feed Range** A wider feed range has been provided to enable the handling of a greater range of parts and materials at maximum cutting efficiency. The New Models 4A, 8A, and 12A have a ratio of 18 to 1 between high and low feeds — Model 16 has an even greater range.

**Greater Carriage Adjustment** Both front and rear carriage of the latest Sundstrand Automatic Lathes are adjustable full length between headstock and tailstock centers — another important new feature.

**Faster Set-Up** Convenient location of pick-off gears for changing spindle speeds and front and rear carriage feeds is provided. Feed and speed chart and pick-off gear storage compartments are readily accessible for quick set-up or changeover.

**Quick Cycle Changeover** Complete control of all cycles is provided by adjustment of dogs on a disk. Making cams is eliminated. Changing position of dogs on disk changes length of rapid approach, feed and rapid return strokes — enables operator to set up cycle quickly and change over from one job to another easily.

**Automatic De-Clutching** All new models have been provided with automatic declutching between spindle and spindle motor with self-adjusting magnetic clutch and brake for quick stopping of spindle rotation.

**Screw Feed to Front Carriage** All new Sundstrand Automatic Lathes have screw instead of rack feed to the front carriage — resulting in fine finish and long tool life.

## 4 Models Cover HP Range of 3 to 75 HP

| | MODEL 4A | MODEL 8A | MODEL 12A | MODEL 16 |
|---|---|---|---|---|
| SPINDLE MOTOR | 3 to 10 HP | 10 to 25 HP | 20 to 50 HP | 50 to 75 HP |
| SPEED RANGE (Type A)<br>(Type B) | 60 to 1800 RPM<br>120 to 3600 RPM | 40 to 1200 RPM<br>80 to 2400 RPM | 30 to 900 RPM<br>60 to 1800 RPM | 15 to 750 RPM |
| FEED RANGE | .003 to .048 IPR. | .004 to .070 IPR | .004 to .070 IPR | .0025 to .100 IPR |
| FRONT CARRIAGE:<br>Longitudinal feed with angular feed-in, max.<br>Swing over cross slide, max.<br>Rapid traverse rate | <br>5"<br>8¾"<br>275" | <br>6"<br>12½"<br>250" | <br>8"<br>15¼"<br>250" | <br>12"<br>17"<br>250" |
| REAR SLIDE:<br>Max. Stroke | 4" | 5½" | 6½" | 8" |
| LENGTH BETWEEN CENTERS | 15, 24 & 36" | 24, 36, 48 & 60". | 24, 36, 48 & 60" | 36, 60 & 84" |

## FREE Additional Data...

The complete new line of Sundstrand Automatic Lathes includes the Models 4A, 8A, 12A and 16 ranging from 3 to 75 HP. Write for complete information on these new machines today. Ask for Bulletin 727.


SUNDSTRAND

**SUNDSTRAND**
**Machine Tool Company**
**2540 Eleventh St. Rockford, Ill., U.S.A.**

DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES

# INVESTIGATE!

## and use the LAPMASTER...

*Above, parts lapped at high production on Lapmaster. Left, Model 12 Lapmaster in operation. Other machines available in complete range of sizes.*

## If You Want PRECISION FLATNESS, FINISH and PARALLELITY in PRODUCTION QUANTITIES

A manufacturer of hardened high carbon steel valves required parts lapped to a degree of flatness for withstanding 2000 P. S. I. air pressure with no leakage. The part shown above is $\frac{3}{8}$" in diameter and $\frac{1}{16}$" thick. It is precision lapped on each side with the Lapmaster 12" at the rate of 195 pieces per 5 minute lapping cycle per side.

Prior to his investigation of the Lapmaster, the manufacturer had not been able to find a satisfactory method of lapping these valve parts. He reported that he would have been unable to make this valve to its existing design without the Lapmaster. The economies of production it afforded made it possible for him to produce the valve at a marketable cost.

### Use this FREE Laboratory Service to determine Your Exact Needs . . .

In order to determine whether lapping would be practical and profitable for you, we maintain a laboratory for lapping sample parts. If you believe it may offer possibilities in your plant we invite you to send prints of the parts, together with surface finish requirements and production desired. In addition send several parts for test lapping in our laboratories. We can then give you the facts on what you can expect from the Lapmaster. There is no obligation for this service.


### ADDITIONAL DATA...

on the complete line of Lapmasters is available on request. Write for your copy today. Ask for bulletin. TE-1.

## Consistent Flatness of 1 Light Band Opens Possibilities for Product Improvement

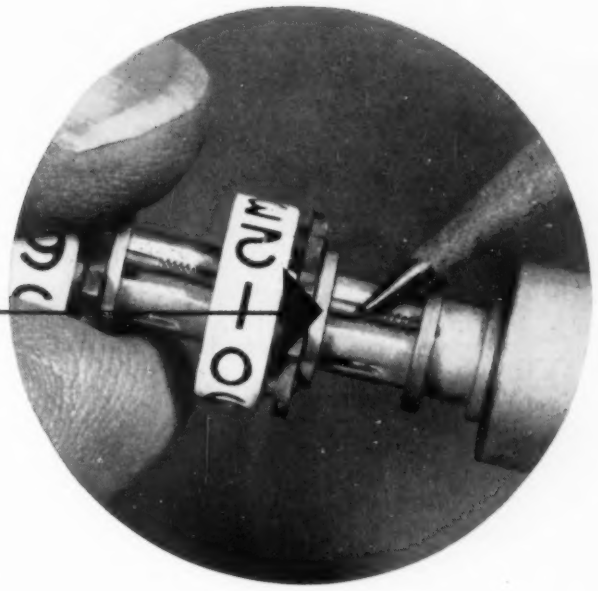
Manufacturers of pumps, compressors, and equipment containing liquids or air under high pressures have found it possible to eliminate gaskets in mating surfaces because of the extreme accuracy of work produced by the Lapmaster. Quality of surface (RMS) is controlled by Lapmaster compounds. Micro-inch finishes of 2 to 3 RMS are common. Surface flatness can also be held to less than one light band or .0000116". (11.6 millionths of an inch.)

JOHN CRANE

PACKINGS | MECHANICAL SEALS | TEFLON PRODUCTS | LAPMASTER LAPPING MACHINE | PIPE SEALING COMPOUNDS

**CRANE PACKING COMPANY** 1823 Belle Plains Avenue Chicago 13, Illinois

## Eyestrain here *used to be* a big cost factor for **MONROE**



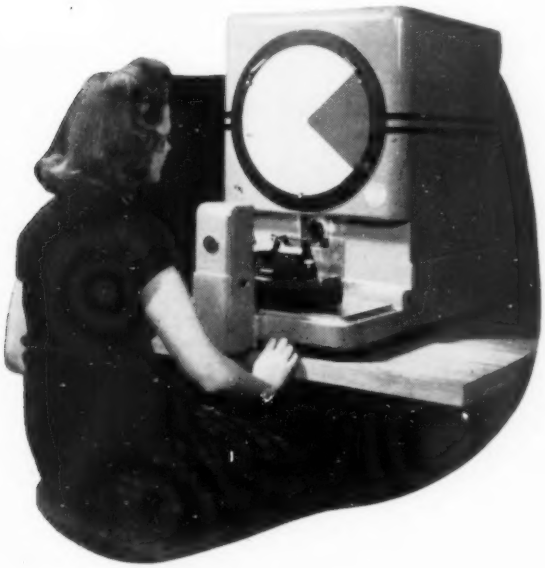
These little plunger pins locate the dials on the Monroe LA Desk Calculator. Each has a 90° cone point that fits into a detent of 110° included angle.

Previously, binocular microscopes were used to check cone angle, length, roundness, and diameter of these pins. But, the inspectors had to spend considerable time just resting their eyes—and running up the cost of the reliability that Monroe customers expect.

Now the microscopes are gone and checking these pins on the Kodak Contour Projector, Model 3, is more like watching television. Moreover, with the unique Surface Illuminator of the Kodak Contour Projector, inspectors are able to check surface finish on the cone tip of the plunger at 50×, to make sure of free movement and positive stopping of the calculator dials.

Many other parts involved in the foolproof operation of Monroe calculating machines are being inspected in large volume on a battery of Kodak Contour Projectors, Model 3. They average about 13 critical dimensions for each part, shapes are mostly rather complex. By carefully engineered mechanical gages, Monroe had brought the inspection time per piece down to an average of about 50 seconds. Optical gaging on the Kodak Contour Projector has brought this average down to 12 seconds.

If you'd like to find out if such economies could be effected in your production program, write and ask us for more information. Eastman Kodak Company, Industrial Optical Sales Division, Rochester 4, N. Y.



### the KODAK CONTOUR PROJECTOR


A new sound movie shows how to simplify complex inspection problems. We'll tell you how to get it for a showing.

Kodak


# CLIPPER

## PRECISION DIAMOND TOOLS


Industrial Diamonds
Thread Grinders
Turning Tools
Engraving Tools
Dressing Tools
Diamond Powder




Manufacturers of
DIAMOND TOOLS WHEELS
and Hones of the highest quality.
Prompt deliveries.


*Ask for Literature*
Representatives in Principal Cities

**CLIPPER DIAMOND TOOL CO., INC.**
21 WEST 46th STREET, NEW YORK 36

USE READER SERVICE CARD; INDICATE A-1-160-1

# THAYER TOGGLE CLAMPS

## REDUCE CLAMPING COSTS

**Rugged, Sturdy, Built for HEAVY-DUTY WORK**

•

**Long Life at Pivot Points Because of HARDENED STEEL BUSHINGS**

Bushings have a serrated surface, Can't come loose. No wear on the body of the clamp. No need for reaming new holes for pins; less waste; scrap eliminated. Pins easily replaced; push out old, push in new. Time saved, costs reduced.

Hold down arms and handle made of ¾" and 1" square solid steel.

**Handle Is Down in LOCKED or UNLOCKED POSITION on many of our models**

Gives clearance above fixture for fast loading and unloading, an exclusive feature. Holding pressure up to 2500 lbs.

*WRITE FOR LITERATURE AND NAME OF DISTRIBUTOR*

**E & E ENGINEERING CO.**
14404 Mack Ave. • Detroit 15, Michigan

USE READER SERVICE CARD; INDICATE A-1-160-3

# Important addition

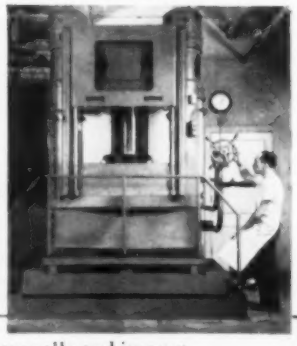
## To SUMMIT-ROBERTS TOOL CO.

## ... a 2500 ton hobbing press

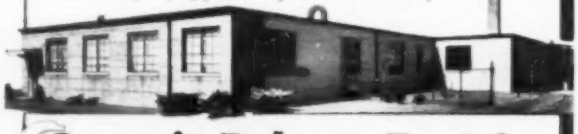
For over 20 years we have hobbed cavities in only the highest quality hobbing steel. Now, by industry demand we offer our services to cold hobb your cavities for

**MOLDS for Plastics**
**Die casting Dies**

We can make the hobbs or use yours.



Visit our plant personally and inspect our modern facilities, where you will see one of the most unusual, outstanding and fully equipped shops in the country.

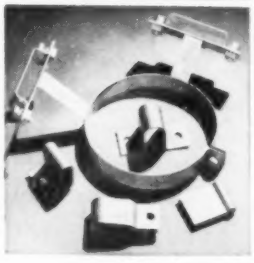


**Summit-Roberts Tool Co.**
830 NEW YORK AVE. • TOLEDO, OHIO

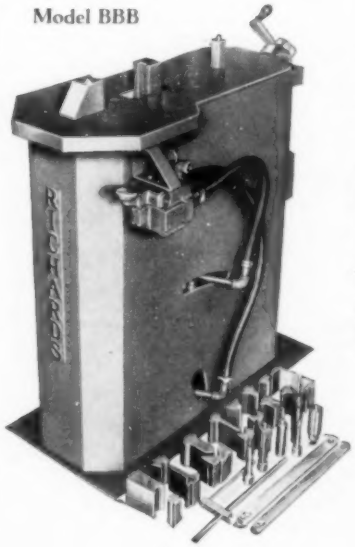
USE READER SERVICE CARD; INDICATE A-1-160-2

# MULTIFORM BIG BROTHER BENDER

**Produces Without Special Tooling—Saves Die Costs Saves on Expensive Presses**



Model BBB



Illustrated above are a few of the many forms that can be produced efficiently on the Multiform Bender, using the standard tooling.

The heavy duty Big Brother Bender is designed for fabricating bus bars, brackets, fixtures, etc., without special tooling. Air controlled with finger tip response. Comes complete with dies, mandrels and wrenches—punching and blanking dies extra. Will punch holes up to 1" and form material up to ¼" thick by 4" wide. We also build smaller hand or air operated models for forming up to ⅛"x1½" material.

*Send for illustrated folder TE-5*

**J. A. RICHARDS CO.** 903 North Pitcher St. Kalamazoo, Michigan
1810 READING RD., CINCINNATI, OHIO

USE READER SERVICE CARD; INDICATE A-1-160-4

# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

## AUTOMATICALLY-LOADED Lo-swing IMP handles various length and diameter bushings

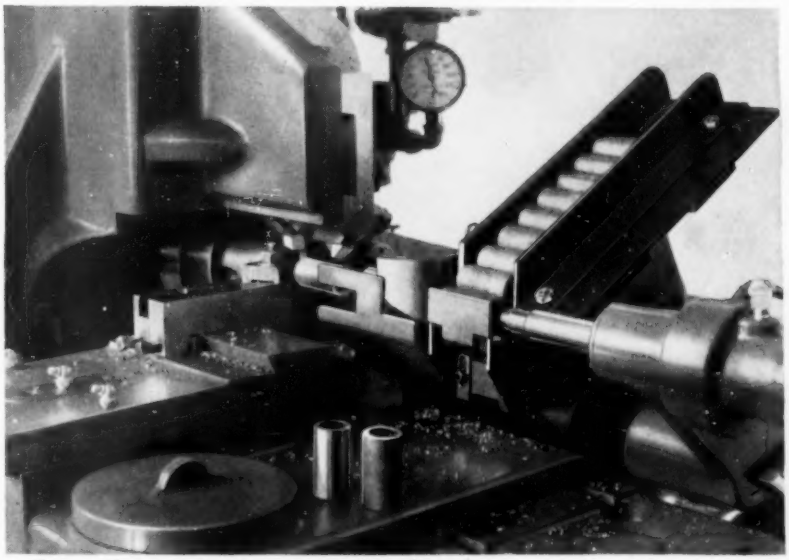
*Problem:* Turning and facing *both* ends of a variety of bronze bushings on automatically loaded lathe. Bushings to vary in length and diameter, and to come to machine rough cast with hole broached.

*Solution:* Bushings are loaded onto an expanding arbor by a plunger which picks up the bottom bushing from the inclined chute shown in upper illustration. A movable stop locates the bushing on the arbor and then withdraws to allow tools on the Third Slide (see lower illustration) to face *both* ends of the bushing to length. Simultaneously, the Front carriage tool turns the O. D. A stripper kicks the finished bushing off the arbor and into the unloading chute while tools are returning to starting position.

When bushings of another diameter are to be turned, ease and quickness in change-over are provided. The operator merely changes the arbor loading plug, makes a quick adjustment to take care of longitudinal tool travel, and resets the tools. If there is sufficient change in bushing diameter to necessitate a different spindle speed, a change of easily-accessible pick-off pulleys makes this a simple operation. The loader chute is made adjustable to accommodate various bushing lengths and diameters.

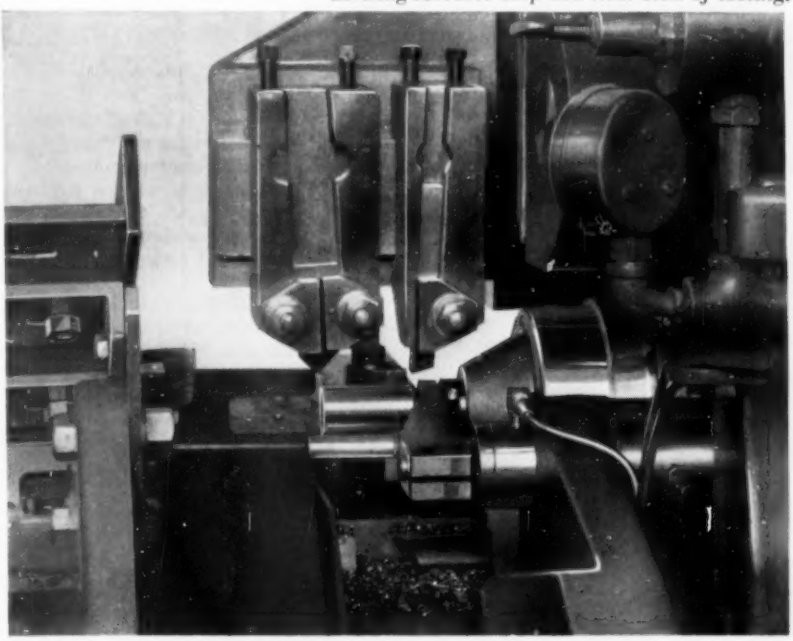
The Lo-swing IMP worked out very well on this job due to the availability of the Third Slide for the facing operations, thus leaving the rear of the machine open for loading and unloading. Tungsten Carbide Tools were used on this job with speeds and feeds set accordingly. Other inherent IMP features, such as rigidity, accuracy at high speeds, and ease of change-over contributed also in large measure to the satisfactory solution of the job.

SENECA FALLS MACHINE CO.
SENECA FALLS, N. Y.



*Above: Close-up view from front of machine showing Loader Chute and Loading Plunger.*

*Below: Close-up view from rear of machine, showing Movable Stop and clear view of tooling.*



PRODUCTION COSTS ARE LOWER WITH Lo-swing


● KLAMP-LOK tools are rugged, rigid and extra strong—and are proving their superiority in hundreds of plants all over the country.

Multiple-sided cutting edges of the TALIDE insert, turned end for end, give exceptionally long service life between grinds—and can be reground without removing toolholder from the machine setup. Equally adaptable for either conventional or inverted type of mounting, the KLAMP-LOK toolholder cuts costs on all types of tough, high-speed production jobs.

Solid TALIDE inserts are stocked in 9 standard sizes and 4 standard grades. KLAMP-LOK toolholders are available in 10 standard styles and 70 standard sizes.

Write or wire today for circular No. KL-52, or ask your nearest TALIDE service engineer for a personal demonstration. **Metal Carbides Corporation, Youngstown 7, Ohio.**

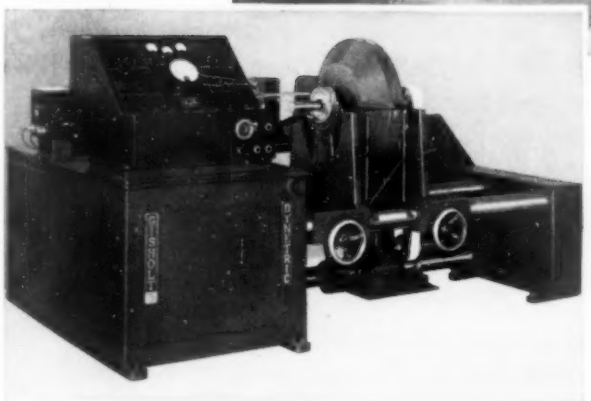
**HOW TO ORDER**

You can order direct
(24-hour service) from warehouses
in Newark, Youngstown,
Detroit or Chicago.
Place order, too,
for Talide Tools and Tips.

METAL CARBIDES CORPORATION
TALIDE
YOUNGSTOWN 7, OHIO

SINTERED CARBIDES · HOT PRESSED CARBIDES
TUNGSTEN ALLOY HEAVY-METAL
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

# Screaming Power for the flying jets!



## Smoothed by GISHOLT BALANCING

Heart of the jet propulsion engine is the high speed impeller (air compression member) which rotates at speeds above 15,000 r.p.m. The impeller must be free from any trace of unbalance, for at such speeds, the slightest vibration is disastrous.

*Gisholt DYNETRIC Balancing Machines* do the job so well that these ultra high speed rotors spin with an off-center displacement of less than .000025"! They make such a quick, easy and accurate job of it that they are used almost universally for this work.

In fact, Gisholt DYNETRIC Balancing can be used to balance anything that rotates—from ½ ounce to 50 tons. Freedom from unbalance vibration means greater safety, less wear, better service—and distinctly longer life.

**Write for free booklet "Static & Dynamic Balancing."*

DYNETRIC BALANCERS — GISHOLT — DEVELOPED JOINTLY WITH WESTINGHOUSE ELECTRIC CORPORATION. "DYNETRIC" IS A TRADE MARK REG. U. S. PAT. OFFICE BY WESTINGHOUSE ELECTRIC CORPORATION

**THE GISHOLT ROUND TABLE**

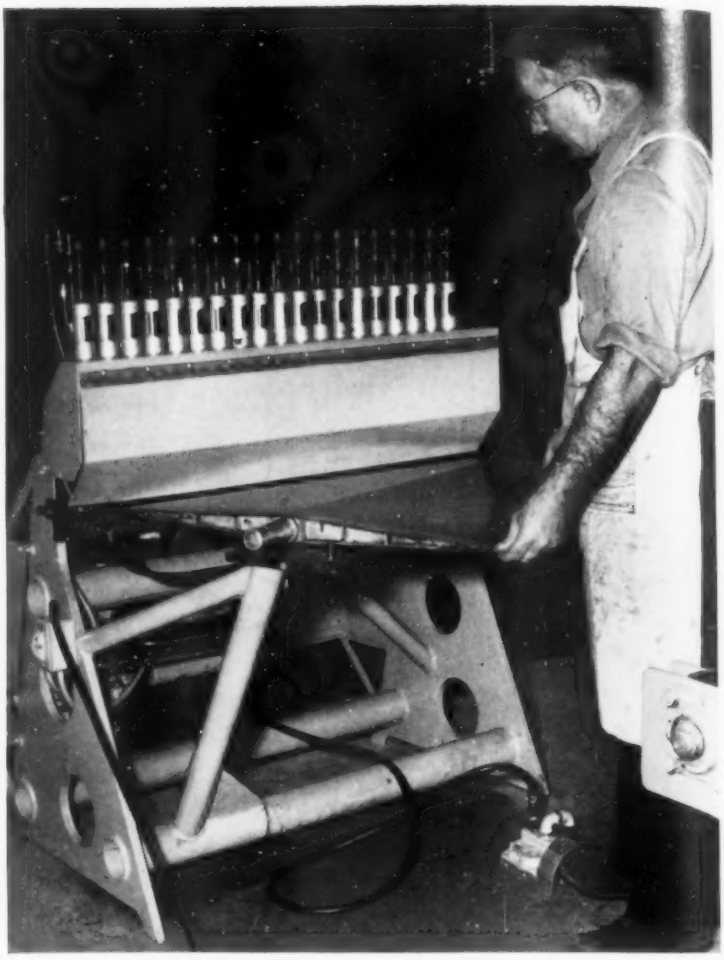
*represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

# GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

**TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES**

# Machine devised with 19 Keller AIRFEEDRILLS *Saves 83% of Time* needed for drilling guided missile fins



**Airfeedrill Features:**

- Accurate holes without costly fixtures
- Attaches in any position, at any angle
- Entirely air-controlled and operated
- Pneumatic cycling to speed production
- Used in close centers, and in tight places
- Easily shifted from job to job
- Drills metal, wood, composition, plastics

This ingenious device drills 19 holes simultaneously in the leading edge of a guided missile fin . . . then the fin is turned over and seven more holes are drilled in the trailing edge.

The entire operation takes only 36 seconds. Formerly the same job was done by hand and required 4.2 minutes—7 times as long.

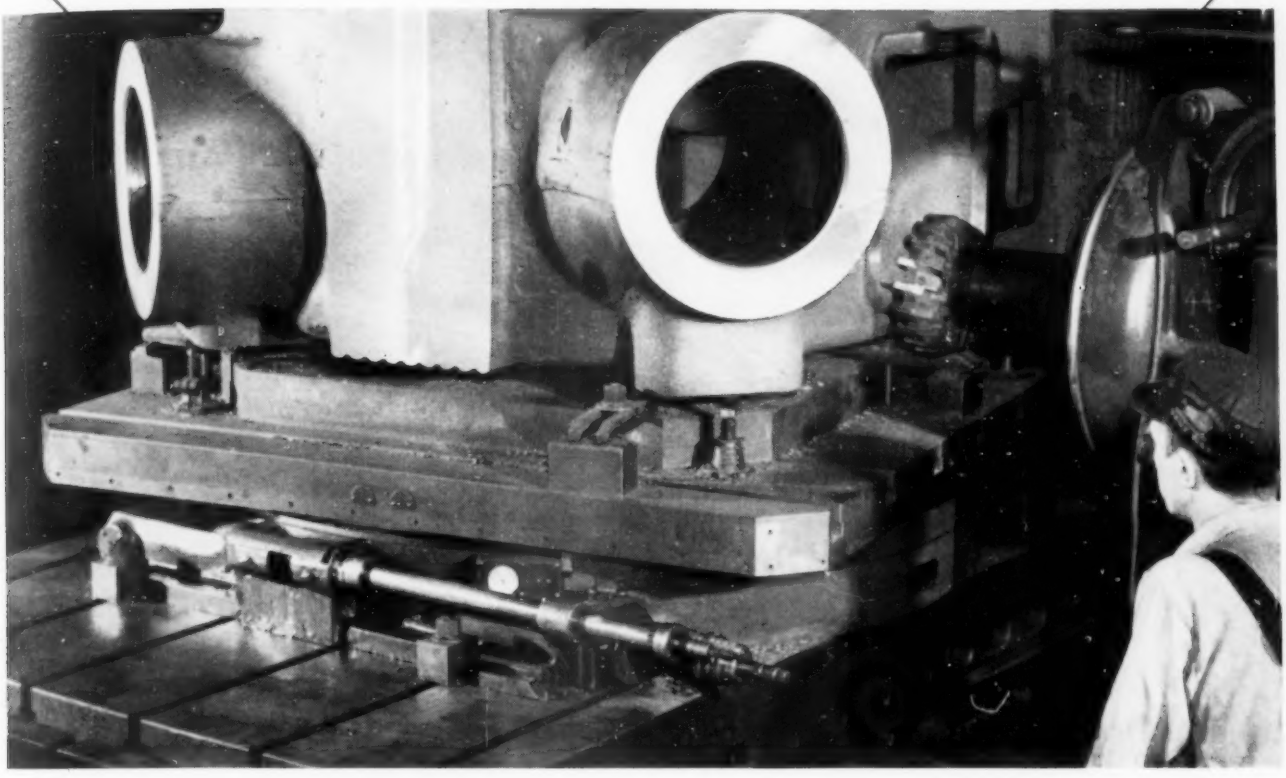
Keller Airfeedrills—19 of them—were incorporated in the machine because (1) they reduced tool design time, (2) they reduced tool fabricating time, and (3) they are reducing down time during production.

Automatic selection of the drilling pattern is accomplished electrically. Pressing once on a single control valve causes the desired Airfeedrills to start, advance, drill, and shut off—all automatically.


**KELLER**
*Pneumatic Tools*

KELLER TOOL COMPANY, GRAND HAVEN, MICH.

# How to beat multiple setups and cut unit costs too!



**Giddings & Lewis Rotary Tables increase machine flexibility and working range on Horizontal Boring Mills**

G&L Rotary Tables turn set-up time into profit time, perform many complex machining operations in a *fraction of the time* it takes on conventional tables. You can rotate and rapidly index work in horizontal, vertical or tilted positions without usual delays.

Illustration shows combination plain and hand feed Rotary Table that may be turned rapidly by hand to approximate position. Fine adjustments are made with hand crank. Other round or square sizes are available up to and including the 60″ x 96″ rectangular platens. Close-limit machining is made possible by table graduations to ½°, handy indexing stops, and dial indicator, accurate to .001″.

For all the information on G&L Rotary Tables for all types of horizontal boring, drilling and milling machines — write direct or contact your nearest G&L Distributor for bulletin A-20.

**Available in Plain, Hand and Combination Power Feed Models**

**PLAIN** — recommended for light work of two or more surfaces. Sizes: Round — 24″ to 48″; Square 30″ to 48″.

**HAND** — recommended for several surfaces. Round — 24″ to 30″.

**COMBINATION, PLAIN, HAND AND POWER FEED** — has 18 power feeds. Sizes: Round — 36″ to 60″; Square 36″ to 60″, Rectangular — 36″ x 48″ to 60″ x 96″.

**GIDDINGS & LEWIS MACHINE TOOL CO.**
FOND DU LAC, WISCONSIN

# GLENCO
## FLOATING TOOL HOLDERS

## SAVE SET-UP TIME

No fine adjustments needed. These holders automatically compensate for and correct misalignment. Just set them within 1/32" radius or 1/16" diameter. The holder does the rest — produces perfect work even on worn machines.

### Don't Miss This Sure Thing

We'll take all the gamble. Just order any stock size and use it 30 days. You may return it without obligation if in 30 days it hasn't proved its worth on your own jobs. Just keep tab on the reduction in rejects and saved down time and you'll KNOW what these holders can mean in dollars and cents when fully installed in your shops.

***Send for Data Folder J for complete specifications on styles and sizes***

Utility Tools

THE J. C. GLENZER CO., Inc.
1552 E. NINE MILE ROAD, DETROIT 20, MICH.

USE READER SERVICE CARD; INDICATE A-1-166-1

# Stadoil
## DIAMOND LAPPING OIL

## doubles the life of diamond wheels!

Here's the lubricant that removes all gum or glaze, and keeps wheels from loading. With Stadoil, no pressure is needed in sharpening. Thus, wheels and cutters last twice as long. You get extra fine tool edges, free from scratches.

Stadoil is recommended by all diamond wheel manufacturers for carbide tool grinding. It's also an excellent carrier for diamond dust. Over 6000 industrial users. 18th year. Sold in half-pint to 50-gallon quantities. Order from your industrial distributor, or if he can't supply, order direct from factory.

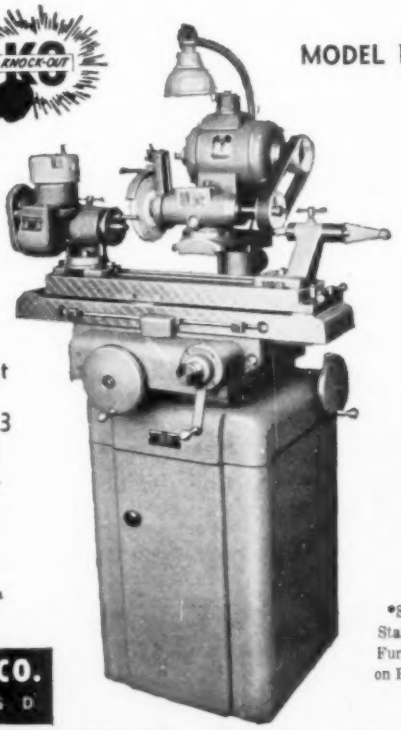
For information, write Dept. 5

STADOIL MANUFACTURING CO., EL MONTE 3, CALIF.

USE READER SERVICE CARD; INDICATE A-1-166-2

# There's a reason 76%*
## of all popularly-priced Tool and Cutter Grinders sold in 1952 were *"Knock-Outs"*


MODEL B860



Will do anything that machines costing 2 or 3 times more will do . . . yes and in less time.

Distributed Only Through Franchise Dealers

K. O. LEE CO.
ABERDEEN, S. D.

*Sales Statistics Furnished on Request

USE READER SERVICE CARD; INDICATE A-1-166-3


Threadwell
TAPS
THREADWELL
1/2-14
NC
HS
4 & B
THREADWELL REFERENCE GAGE
THREADWELL TAP & DIE CO. Greenfield, Mass., U. S. A.

# Tap Recommendations for Various Classes of Fit

## FOR MACHINE SCREW SIZES

| MACHINE SCREW SIZES | THREADS PER INCH | | | CLASS OF FIT | | | |
|---|---|---|---|---|---|---|---|
| | N. C. | N. F. | N. S. | 1 | 2 | 3 | 4 |
| 0 | | 80 | | PG1 | PG1 | PG1 | |
| 1 | 64 | | | PG1 | PG1 | PG1 | |
| | | 72 | | PG1 | PG1 | PG1 | |
| 2 | 56 | | | PG1 | PG1 | PG1 | |
| | | 64 | | PG1 | PG1 | PG1 | |
| 3 | 48 | | | Cut | CG | PG1 | |
| | | 56 | | Cut | CG | PG1 | |
| 4 | | | 36 | Cut | CG | PG1 | |
| | 40 | | | Cut | CG | PG1 | |
| | | 48 | | Cut | CG | PG1 | |
| 5 | 40 | | | Cut | CG | PG1 | |
| | | 44 | | Cut | CG | PG1 | |
| 6 | 32 | | | Cut | CG | PG1 | |
| | | 40 | | Cut | CG | PG1 | |
| 8 | 32 | | | Cut | CG | PG1 | |
| | | 36 | | Cut | CG | PG1 | |
| 10 | 24 | | | Cut | CG | PG1 | |
| | | 32 | | Cut | CG | PG1 | |
| 12 | 24 | | | Cut | CG | PG1 | |
| | | 28 | | Cut | CG | PG1 | |
| 14 | | | 20 | Cut | CG | PG2 | |
| | | | 24 | CG | CG | PG1 | |

## FOR FRACTIONAL SIZES

| FRACTIONAL SIZES | THREADS PER INCH | | | CLASS OF FIT | | | |
|---|---|---|---|---|---|---|---|
| | N. C. | N. F. | N. S. | 1 | 2 | 3 | 4 |
| ¼ | 20 | | | Cut | CG | PG2 | PG01 |
| | | 28 | | CG | CG | PG1 | PG01 |
| 5/16 | 18 | | | Cut | CG | PG2 | PG01 |
| | | 24 | | CG | CG | PG1 | PG01 |
| ⅜ | 16 | | | Cut | CG | CG | PG01 |
| | | 24 | | CG | CG | PG1 | PG01 |
| 7/16 | 14 | | | Cut | CG | CG | PG01 |
| | | 20 | | CG | CG | PG2 | PG01 |
| ½ | 13 | | | Cut | CG | CG | PG01 |
| | | 20 | | CG | CG | PG2 | PG01 |
| 9/16 | 12 | | | Cut | CG | CG | PG1 |
| | | 18 | | CG | CG | PG2 | PG1 |
| ⅝ | 11 | | | Cut | CG | CG | PG1 |
| | | 18 | | CG | CG | PG2 | PG1 |
| ¾ | 10 | | | Cut | CG | CG | PG1 |
| | | 16 | | CG | CG | PG2 | PG1 |
| ⅞ | 9 | | | Cut | CG | CG | PG1 |
| | | 14 | | CG | CG | PG2 | PG1 |
| 1 | 8 | | | Cut | CG | CG | PG1 |
| | | 14 | | CG | CG | PG2 | PG1 |
| 1⅛ | 7 | | | CG | CG | CG | |
| | | 12 | | CG | CG | CG | |
| 1¼ | 7 | | | CG | CG | CG | |
| | | 12 | | CG | CG | CG | |
| 1⅜ | 6 | | | CG | CG | CG | |
| | | 12 | | CG | CG | CG | |
| 1½ | 6 | | | CG | CG | CG | |
| | | 12 | | CG | CG | CG | |

### Class 1—Loose Fit

—for threaded parts calling for quick assembly and permitting a generous amount of shake or play.

### Class 2—Free Fit

—for threaded parts that may be assembled entirely or almost entirely with the fingers and permitting a slight amount of shake or play.

### Class 3—Medium Fit

—for threaded parts which are to be assembled with the fingers entirely or almost entirely and having the minimum shake or play between members.

### Class 4—Close Fit

—for threaded parts requiring the most exacting precision fit and calling for a screw driver or wrench for assembly.

**CUT** Cut thread taps, either carbon or high speed.

**CG** Commercial Ground Thread Taps (High Speed).

**PG2** Precision Ground Thread Taps (High Speed) with Pitch Diameter 2 Limit—Basic plus .0005" to basic plus .0010".

**PG1** Precision Ground Thread Taps (High Speed) with Pitch Diameter 1 Limit—Basic to basic plus .0005".

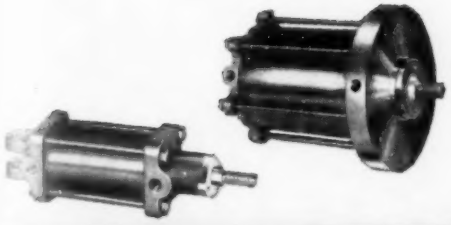
**PG01** Precision Ground Thread Taps (High Speed) with Pitch Diameter 01 Limit—Basic to basic minus .0005".

Threadwell

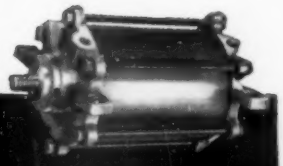
Threadwell Tools do many jobs


they can do your tough ones

THREADWELL TAP & DIE CO. Greenfield, Mass., U. S. A.



## Pneumatic Cylinders



# NOW...

## HANNIFIN HAS THE MOST COMPLETE LINE OF AIR CONTROL EQUIPMENT!

**Really complete, the Hannifin line of pneumatic cylinders is made with two types of pistons . . . bores from 1″ to 16″ . . . six standard mountings. Really standard, these cylinders are tooled to tolerances that assure accurate mounting to make assembly to your machines easier. Really built, each cylinder is "TRU-BORED" and honed, piston rods are ground and polished, interchangeable end caps, heavy duty tie rods . . . rugged, yet precision construction throughout!**

**Write for Bulletin 210**

## NEW! REVOLUTIONARY HANNIFIN *P-M Pilot-Master Valves*

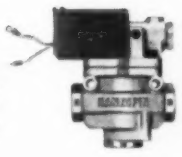
Piston-operated poppet design. Exclusive replaceable cartridge for easier maintenance. Speeds to 600 cycles per minute. Pressure from 15 to 150 p.s.i. Integral, solenoid-controlled pilot heads or a choice of 10 separate pilot valves for remote control.

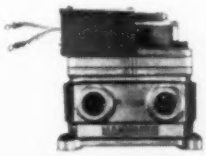
- Fewer Valves to Stock
- Fewer Parts to Stock
- Maximum Interchangeability
- No Springs in Main Valve

**Write for Bulletin 231.**

**2 and 3-Way Valves.**

Same valve operates 2-way or 3-way, normally open or normally closed. ⅜″ to 1¼″ I.P.S.





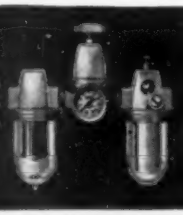
**4-Way Valves.**

Two 3-way valves mounted in compact, common body. Two piston poppets. Two cartridges. ⅜″, ½″, ¾″ I.P.S.

***EXCLUSIVE REPLACEABLE CARTRIDGE***

**AIR WARDEN**

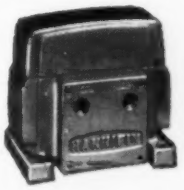
Air filters, pressure regulators and lubricators to protect air operated equipment. Bulletin 1010B.



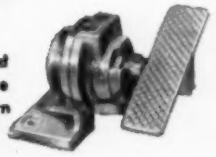
## Disc Type Air Control Valves

**Designed for smooth, positive and accurate control of air-operated equipment. Bronze discs lapped to perfect seal with seats. Packless design. For hand, foot or electrical operation. Sizes: ⅛″ to 1¼″ I.P.S.**

**Write for Bulletin 57-W**



**Hannifin "Directair" electrically controlled air-operated disc valve**



**Foot-operated treadle valve (Also spring return and rotary types)**

**Standard hand control valve (Single or duplex)**

# HANNIFIN

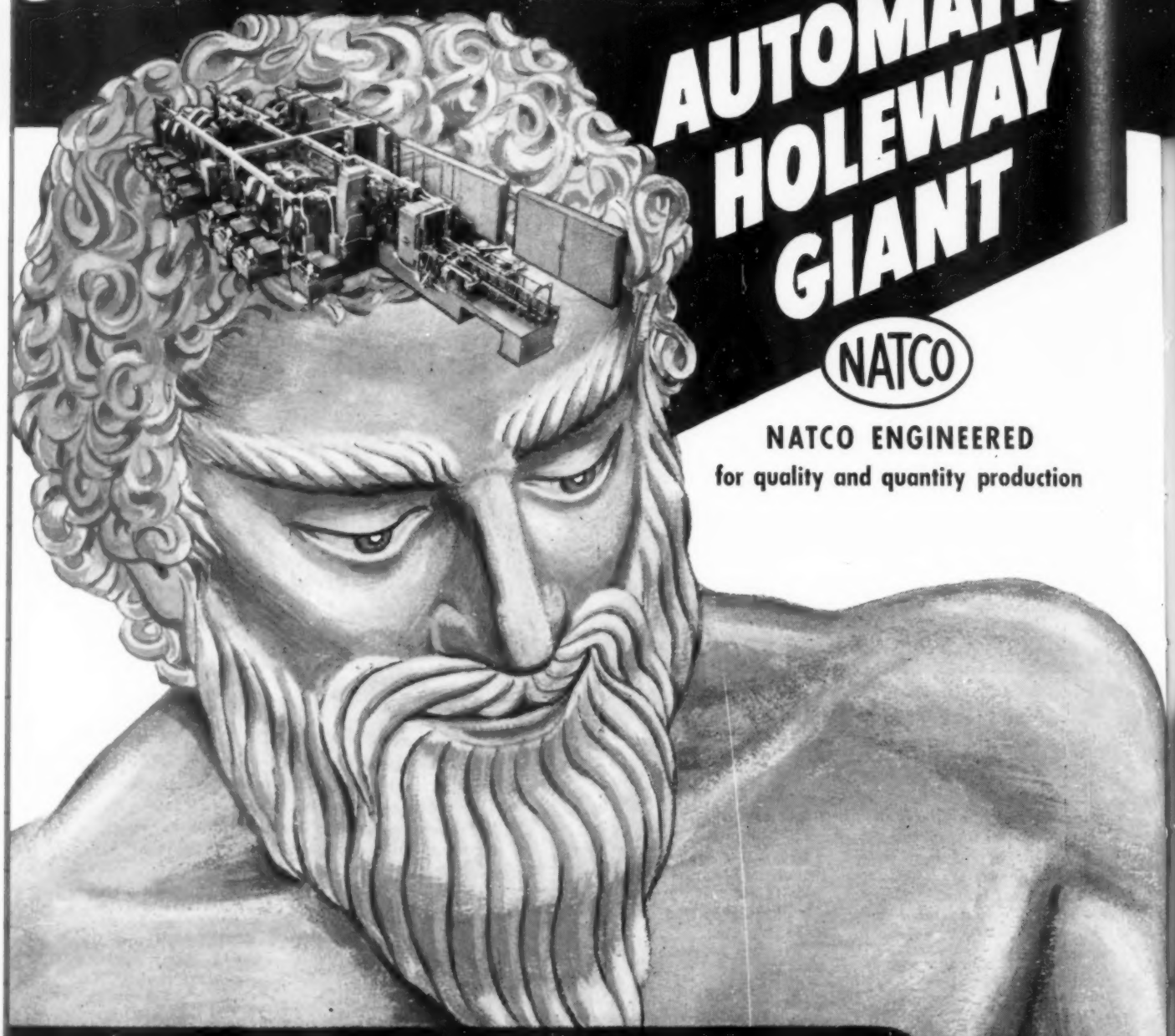
**Hannifin Corporation, 1119 S. Kilbourn Ave., Chicago 24, Ill.**

**Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves**

# See how another AUTOMATIC HOLEWAY GIANT

NATCO

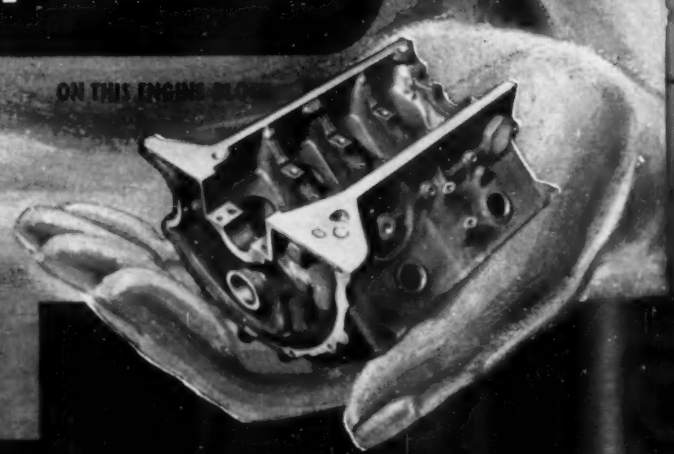
**NATCO ENGINEERED**
for quality and quantity production



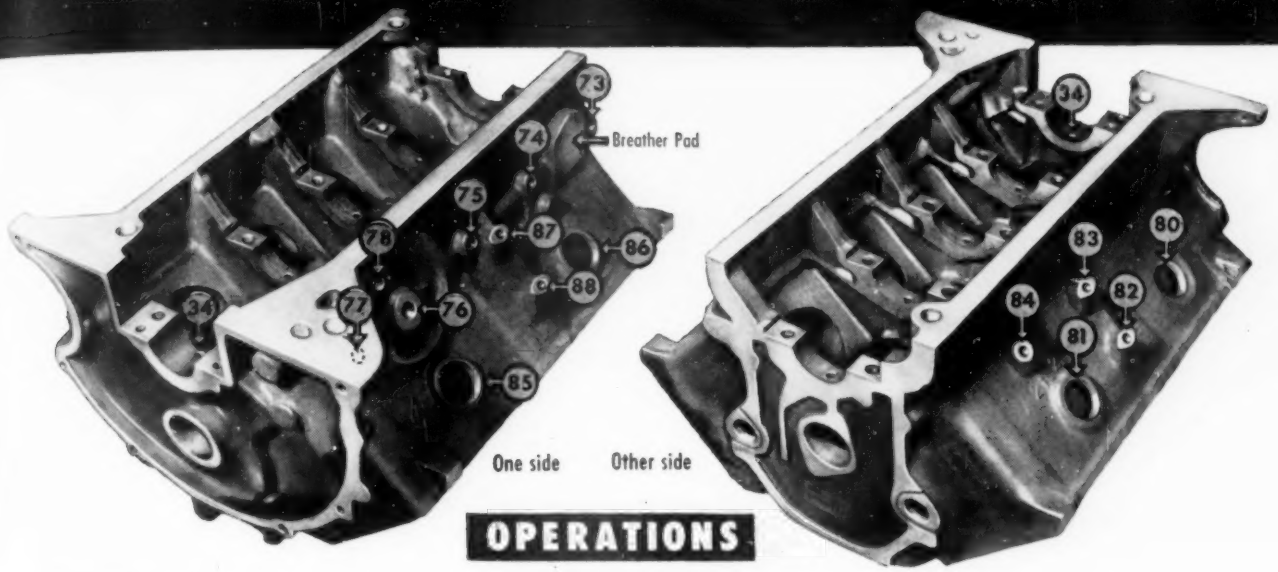
## Completes all 55 operations

### *at the rate of nearly 2 parts per minute*

Including milling, drilling, combination core drilling and chamfering, reaming, combination spot facing and chamfering, combination rough counterboring and spot facing, rotating part 180° vibrating for chip removal, and *Inspecting Holes.*



# PRODUCES 111 PARTS PER HOUR and inspects its own production




## OPERATIONS

**STATION #1 Load 1 part**

**STATION #2**

Right Angular Head (17° above horizontal)
- Drill 1 hole #74 to 7/16" diameter part depth.
- Drill 3 holes #73, #75 and #77 to 7/16" diameter part depth.
- Drill 1 hole #76 to 31/32" diameter part depth.

**STATION #3**

Right Angular Head (17° above horizontal)
- Drill 1 hole #74 to 7/16" diameter additional part depth.
- Drill 3 holes #73, #75 and #77 to 7/16" additional part depth.
- Drill 1 hole #76 to 7/16" diameter additional part depth.

**STATION #4 Idle**

**STATION #5**

Left Angular Head (45° above horizontal)
- Combination core drill and chamfer 2 holes #80 and #81 1-23/32" dia. for 1.750" ream.
- Drill 2 holes #82 and #83 to 3/8" diameter for 7/16" x 14 tap.
- Drill 1 hole #84 to 7/16" dia. through for 1/4 NPSF Thread.

Right Angular Head (45° above horizontal)
- Combination core drill and chamfer 2 holes #85 and #86 to 1-23/32" dia. for 1.750" ream.
- Drill 2 holes #87 and #88 to 3/8" diameter for 7/16" x 14 tap.

**STATION #6**

Left Angular Head (45° above horizontal)
- Ream 2 holes #80 and #81 to 1.750" diameter. Combination spot face and chamfer 2 holes #82 and #83 to size.

Right Angular Head (45° above horizontal)
- Ream 2 holes #85 and #86 to 1.750" diameter. Combination spot face and chamfer 2 holes #87 and #88 to size.

**STATION #7 Idle**

**STATION #8**

Left Angular Head (angle off vertical)
- Drill 1 hole #34 to 1/4" diameter 1/2 depth.

Right Angular Head (17° above horizontal)
- Combination rough counterbore for 4.94" finish diameter and spot face 1-15/16" dia. bolt boss #76.

**STATION #9**

Left Angular Head (angle off vertical)
- Drill 1 hole #34 to 1/4" diameter through.

Right Angular Head (17° above horizontal)
- Finish counterbore 1 hole #76 to 4.94" diameter.

**STATION #10 Idle**

**STATION #11**

Right Angular Head (17° above horizontal)
- Drill 4 holes #73, #74, #75 and #77 to 11/32" diameter additional part depth.
- Drill 1 hole #76 to 11/32" diameter additional part depth.
- Drill 1 hole #78 to 11/16" diameter .24" deep.

**STATION #12**

Right Angular Head (17° above horizontal)
- Drill 4 holes #73, #74, #75 and #77 to 11/32" diameter additional part depth.
- Drill 1 hole #76 to 11/32" diameter additional part depth.
- Drill 1 hole #78 to 9/16" diameter .46" depth.

**STATION #13 Idle**

**STATION #14**

Right Angular Head (17° above horizontal)
- Drill 4 holes #73, #74, #75 and #77 to 11/32" diameter to depth.
- Drill 1 hole #76 to 11/32" diameter to depth.

**STATION #15**

Right Vertical Head
- Mill 4" dia. seat around hole for oil breather tube.

**STATION #16 Idle**

**STATION #17**
- Rotate part 180°, vibrate while rotating from pan face up to pan face down front end leading.

**STATION #18**

Left Side (17° below horizontal).
- Inspect holes to be tapped for drill through and depth 5 holes #73 to #77 incl. (45° below horizontal).
- Inspect holes to be tapped for drill through and depth—2 holes #87 and #88.

Right Side (45° below horizontal)
- Inspect holes to be tapped for drill through and depth 3 holes #82, #83 and #84.

**STATION #19 Unload**
- Oil pan face down front end leading.


*Call a Natco Field Engineer*

**to help you solve your problems in Drilling, Boring, Facing and Tapping.**

NATCO

**NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana**

*Branch Offices*

1809 Engineering Bldg., CHICAGO • 409 New Center Bldg., DETROIT
1807 Elmwood Ave., BUFFALO • 2902 Commerce Bldg., NEW YORK CITY

# Designed for high speed precision work...

**PEGARD**

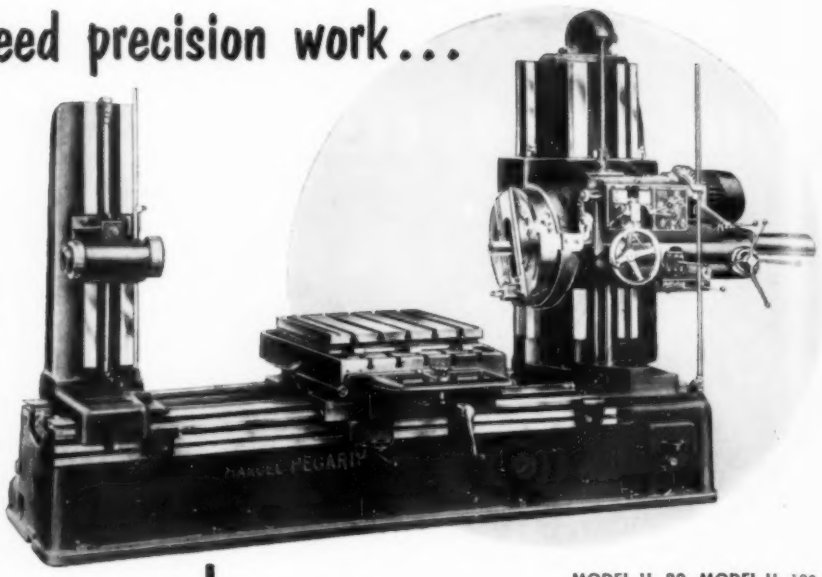
## HORIZONTAL BORING MILLS

Built with extreme accuracy, these fine boring mills have extra features that insure economical operation and high quality work!

- *Precise reading of co-ordinates—with an accuracy of .0005".*
- *High cutting speeds—ideal for tungsten carbide, titanite or diamond tipped tools.*
- *Ease of operation — with unproductive time greatly reduced.*
- *Rigid construction — maintaining initial precision for many years.*
- *Safety — luminous movement control board eliminates faults.*

**PROMPT DELIVERY**

Send for complete 1953 Catalog
Ready January 1st.
*Dealer Territories Open*



**PARTIAL SPECIFICATIONS**

| | MODEL U. 80 | MODEL U. 100 |
|---|---|---|
| Spindle diameter | 3 3/32" | 3 15/16" |
| Spindle traverse | 31 15/32" | 39 3/8" |
| Spindle speeds | 18 | 18 |
| Facinghead speeds | 6 | 9 |
| Long. traverse of table | 51 3/16" | 63" |
| Motor | 7 HP | 13½ |

Write today for full details and specifications.

**MOREY** ...for machine tools!

**MOREY MACHINERY CO., INC.**
*Manufacturers • Merchants • Distributors*
410 BROOME ST. • NEW YORK 13, N. Y.
TELEPHONE: CANAL 6-7400
CABLE ADDRESS: WOODWORK, N. Y.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-172-1

SEND FOR YOUR **FREE COPY**

**NEW ACME BUSHING CATALOG**

Contains America's **LARGEST BUSHING Selection**

Features **2** Standards
A.S.A. Standard *Plus* Acme Standard

Makes Bushing Procurement Easy... Fast! Send For Your FREE Copy Now!

Simplifies, speeds bushing selection. Packed with valuable data. Saves you time and trouble. Also includes liners, leader pins, dowel pins, locating jigs, etc.

**ACME INDUSTRIAL COMPANY**
208 N. Laflin St., Chicago 7, Illinois

*Serving Industry For 28 Years*

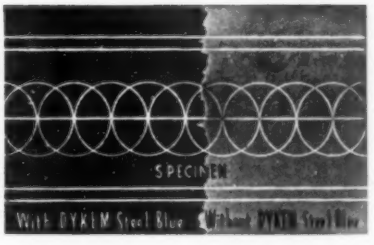
MANUFACTURERS OF DRILL JIG AND FIXTURE BUSHINGS

USE READER SERVICE CARD; INDICATE A-1-172-2

# DYKEM STEEL BLUE

***STOPS LOSSES***

**making dies & templates**




Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout show up in sharp relief and at the same time prevents metal glare. Increases efficiency and accuracy.

*Write for full information*

THE DYKEM COMPANY, 2303D North 11th St., St. Louis 6, Mo.

USE READER SERVICE CARD; INDICATE A-1-172-3

# SUPERVISOR

## METAL-WORKING LABORATORY

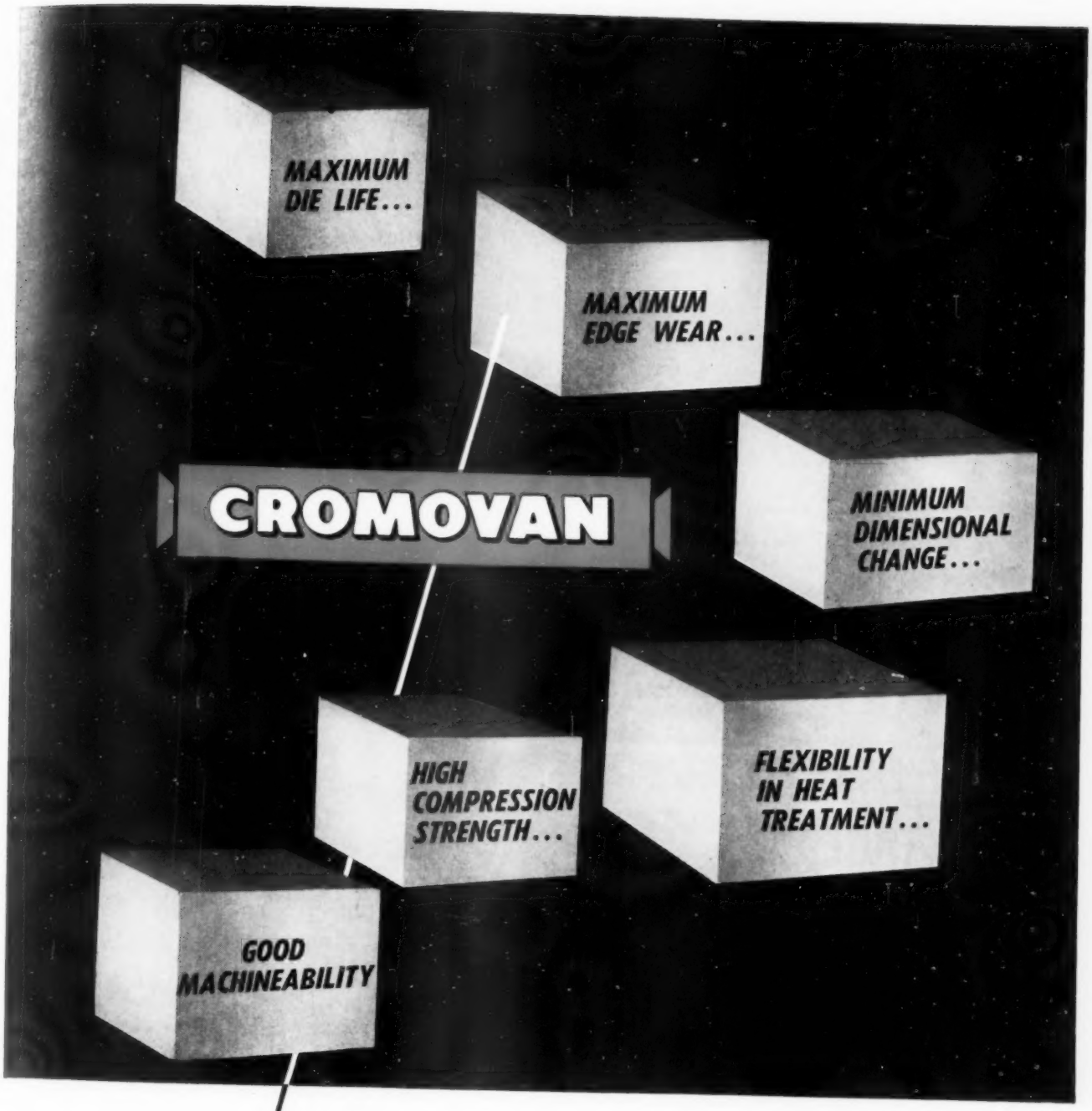
**Major Industrial Company**

An opportunity for a graduate engineer with 5-10 years experience in manufacturing techniques and research who knows engineering design and tool and die design. Must also understand reactions of metals to coolants, gases and other metals.
The man who qualifies for this responsible position will do investigation and development of machining, forming, grinding and various other metal-working techniques on new and presently used materials; supply answers to factory and engineering questions concerning manufacturing methods; provide general manufacturing methods laboratory service for the operating division.

*Write complete details, including education and experience to:*

Box 250A
THE TOOL ENGINEER
10700 PURITAN AVE.
DETROIT 21, MICHIGAN

USE READER SERVICE CARD; INDICATE A-1-172-4




R-271

## high production champion

CROMOVAN is a *high production* steel for long run requirements on blanking and forming dies where low cost production is vital. Tough, hard, highly alloyed Cromovan produces *two* to *three* times the number of pieces in Laminating, Blanking, Forming, Trimming, and Coining dies. Yet Cromovan costs only slightly more than lower quality grades of steel. Safe, easy to use Cromovan assures consistently uniform results.

**Firth Sterling INC**

OFFICES* AND WAREHOUSES: HARTFORD NEW YORK* DETROIT CLEVELAND DAYTON* PITTSBURGH* CHICAGO BIRMINGHAM* LOS ANGELES PHILADELPHIA*

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-173

## Tops FOR TAPPING AND REAMING!

On tapping and reaming jobs the Ziegler holder is something you cannot afford to be without if you are interested in keeping labor costs down to a minimum.

This is because the Ziegler holder achieves a remarkable saving in set-up time. Instead of having to make a set-up that is absolutely accurate, as with ordinary tool holders, all that is necessary is to align the work to within 1/32" of center on the radius, or 1/16" on the diameter, and the Ziegler holder automatically compensates for the inaccuracy. No wonder the Ziegler holder is in such widespread use throughout the nation! What it saves in labor costs pays for it many times over in the course of a year.

**W. M. ZIEGLER TOOL COMPANY**

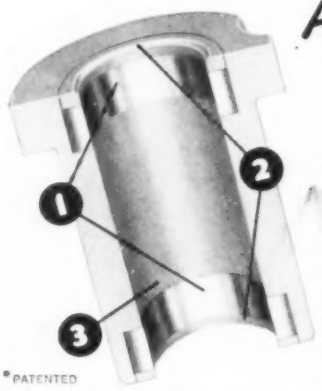
13574 AUBURN DETROIT 23, MICH.

WRITE FOR CATALOG

Ziegler ROLLER DRIVE **FLOATING HOLDER** for Taps and Reamers...

USE READER SERVICE CARD; INDICATE A-1-174-1

## MORE HOLES— MORE ACCURACY— FASTER— AT LESS COST




*PATENTED

1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

**For information and prices write for Meyco Bushing Catalog No. 13**

**MEYCO**

**Carbide Inserted Bushings Are Doing It Daily!**

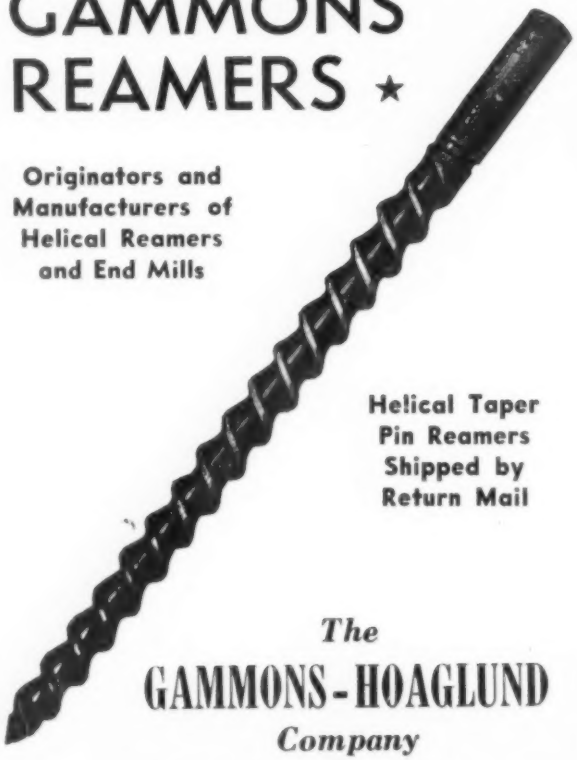
**HOW?** Like this: (1) Last longer . . . with a life—in most cases—as long as solid carbide bushings at prices that come close to the prices of ordinary steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

W. F. MEYERS CO., INC., BEDFORD, INDIANA

USE READER SERVICE CARD; INDICATE A-1-174-3

## GAMMONS REAMERS ★

**Originators and Manufacturers of Helical Reamers and End Mills**



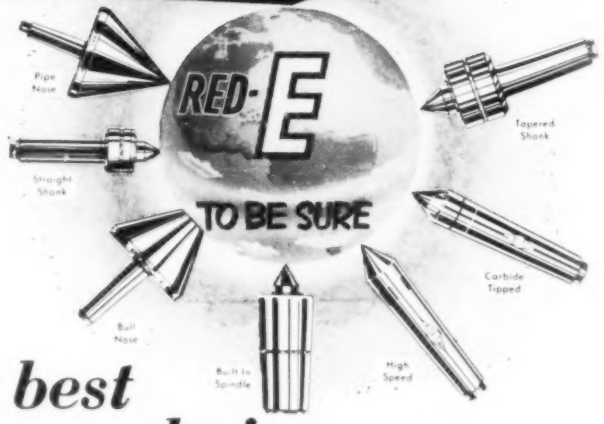
**Helical Taper Pin Reamers Shipped by Return Mail**

*The* **GAMMONS-HOAGLUND** *Company*

**400 Main Street, Manchester, Conn.**

USE READER SERVICE CARD; INDICATE A-1-174-2

## Your ONE source for ALL centers!




## best choice.... productionwise!

• Ready Tool Company is the world's largest manufacturer of precision engineered centers . . . all exclusive developments of RED-E engineers. Varied sizes, tapers and shanks for EVERY NEED . . . guaranteed to reduce operating costs, increase production, eliminate maintenance. Write for literature.

**CENTER** *Specialists since 1908*

RED-E TOOLS **READY TOOL COMPANY** 558 Iranistan Ave. Bridgeport 5, Conn.

USE READER SERVICE CARD; INDICATE A-1-174-4



# HEAT TREATING MAKES STRONG FINGERS FOR COTTON PICKERS

In the southland there's something new on the horizon . . a mechanical cotton picker. It's quite a machine . . picks two rows at once . . handles acres and acres of cotton in nothing flat compared to slow, laborious hand-picking.

It's intriguing to watch this amazing machine. It has 2,560 *rotating steel fingers* that gently probe the open cotton bolls, and deftly pick out the soft, white cotton fibres.

A few years back when the new cotton picker was in the design and testing stage, the carbon steel fingers . . all 2,560 of them came up for some serious attention. The heat treating *had* to be right. For the "fingers" had to be straight and they had to be hard. Just the right hardness . . not *too* hard or they might snap off, and not too soft or they might bend.

Allis-Chalmers brought their problem to the metallurgical and heat treating research laboratories of Lindberg Steel Treating Co. In a short time, Lindberg heat treating specialists, in cooperation with Allis-Chalmers engineers, developed an effective and successful process. It permitted the heat treating of the carbon steel fingers without scaling . . and without distortion . . to precisely the right physical properties.

Solving problems in heat treating is an everyday experience for Lindberg Steel Treating Company. Some 34 metallurgical engineers and metallurgists with a composite heat treating experience of more than 650 years are available to consult with you on any heat treating problem. Your inquiry is invited.

*Plants in*

CHICAGO
222 N. Laflin
MOnroe 6-3443

ROCHESTER
620 Buffalo Rd.
GEnessee 5213

ST. LOUIS
650 E. Taylor
FIreside 6200

LOS ANGELES
2910 So. Sunol Drive
ANgelus 9-7311

*A case history of Lindberg Steel Treating Co. service to American industry*

**LINDBERG STEEL TREATING CO.**

222 North Laflin Street, Chicago 7, Illinois

Phone: MOnroe 6-3308



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-175

# Now . . Micro-F

## HERE'S POSITIVE PROOF

***Results from two of many field tests:***

**TURNING #5665 NICKEL ALLOY**

Old Method — 120 grit Diamond wheel finish — average 12 pieces

New Method — Behr-Manning 220 grit Carbide Tool Finishing Belt — average 34 pieces

**TURNING STAINLESS STEEL VALVES**

Old Method — 100 grit Diamond wheel finish — average 400 pieces

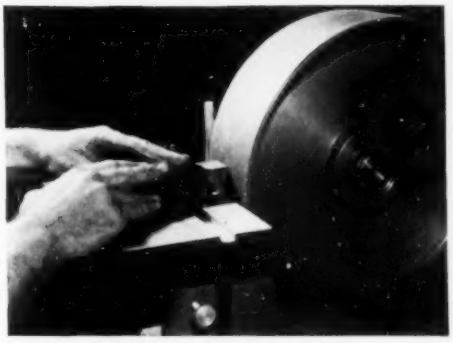
New Method — Behr-Manning 220 grit Carbide Tool Finishing Belt — average 735 pieces

**HERE'S THE COMBINATION THAT DOES IT**

# o-finish your carbide tools without DIAMOND WHEELS

## Great new abrasive belt finishing development by Behr-Manning and Fenlind Engineering Co.

**This entirely new method of micro-finishing carbide turning tools with economical abrasive paper belts, not only saves the high cost of diamond wheels, but also greatly extends the cutting service life of the tools. In addition, the method gives a superior micro-finish — "glacier-cold" edge. No time-consuming diamond hand honing required.**

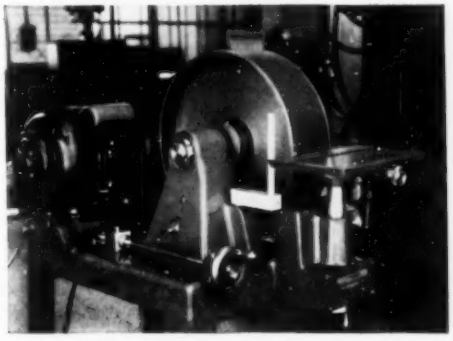


*FENLIND MICRO FINISHER equipped with BEHR-MANNING Carbide Tool Finishing Belt. A simple angle-setting device assures accurate cutting angles.*

### TEST YOUR TOOLS IN YOUR OWN PLANT

**Without obligation, we'll micro-finish your carbide turning tools to your specifications by the new method at BEHR-MANNING, Troy, N. Y., or at any of the following BEHR-MANNING Demonstration Rooms:**

BOSTON
BUFFALO
CHICAGO
CINCINNATI
CLEVELAND
DETROIT
GRAND RAPIDS
HIGH POINT
INDIANAPOLIS
LOS ANGELES
NEW YORK
PHILADELPHIA
PITTSBURGH
ST. LOUIS
SAN FRANCISCO
SEATTLE



BEHR-MANNING

BEHR-MANNING CORPORATION
division of NORTON Company

▲COATED ABRASIVES
▲SHARPENING STONES
▲PRESSURE-SENSITIVE TAPES

For Exports: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A. In Canada: Behr-Manning (Canada) Ltd., Brantford.



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-177

# How a carbide die outperforms a steel die by 25 to 1 for Schick, Inc.

In past six years, a Carboloy die (shown at left) produced over 62,500,000 parts with only 25 regrinds. It saved 4,375 hours of steel-die regrinding time . . . saved 900 hours of press setup time because of longer production runs. Carbide die produces over 2,500,000 pieces per grind . . . steel die, less than 100,000.

Carboloy Cemented Carbide die built for Schick, Inc., in 1946 by Lincoln Park Industries under direction of Mr. George F. Eglinton. Die is still in daily use.

## You get more carbide benefits with Carboloy dies and services!

For blanking, forming, drawing and piercing dies that will stand up under terrific hour-after-hour pounding . . . always specify Carboloy Cemented Carbide.

It's quality-controlled by 29 rigid, probing tests that stem from Carboloy experience as world's largest maker of cemented carbides.

You get extra die life from Carboloy Cemented Carbide — hardest metal made by man — because extra life is built into it!

### Carbide benefits

You or your die maker may order Carboloy Cemented Carbide made to your specifications in rough-finished form. You get all carbide benefits . . . and final finishing and assembly into your dies are easily done in your own toolroom, or by your die maker.

### Carbide specialists

Carboloy Field Engineers are ready with on-your-job solutions to tough die problems . . . and ready to help you design new carbide applications.

### Carbide training

Your key toolroom personnel can learn latest carbide techniques, become expert in finishing and servicing carbide dies at the Carboloy Customer Training School.

### Carbide data

For a handy, all-inclusive guide showing how easy it is to design, use and maintain carbide dies, write for the Carboloy Die Engineering Manual, D-124.

To get the complete story of how Carboloy dies and engineering services offer more carbide benefits . . . greater production with less downtime and maintenance . . . fewer rejects and less refinishing . . . call in your local Carboloy representative or use the handy coupon below.

"Carboloy" is the registered trademark for the products of Carboloy Department of General Electric Company

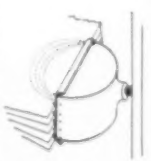
**CARBOLOY**

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11101 East 8 Mile Blvd., Detroit 32, Michigan

Plants at Detroit, Michigan; Edmore, Michigan; and Schenectady, New York

*Magnet ideas for the shop!*



Use Carboloy Permanent Magnet Sheet-Steel Separators to prevent feeding of doubles. And use permanent magnets to give an extra hand all around your shop. They're great for magnetic stands, tool-holding devices, sweepers' pickup tools, magnetic paper grippers, containers for small parts and magnetic retrievers. Write for Carboloy Permanent Magnet Stock Catalog, PM-100. (Use coupon.)

CARBOLOY Department of General Electric Company
11101 E. 8 Mile Blvd., Detroit 32, Michigan

We are interested in the Carboloy services checked below:

☐ Die Training School ☐ Die Engineering Manual, D-124 ☐ Permanent Magnet Stock Catalog, PM-100 ☐ Have a Carboloy Field Engineer call.

Name _____ Position _____

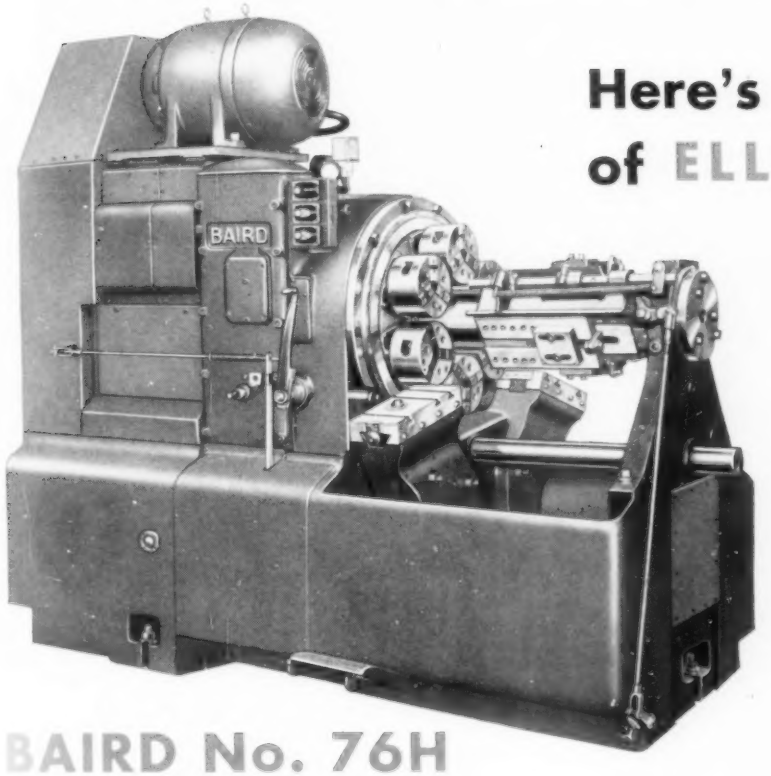
Company _____

Address _____

City _____ Zone _____ State _____

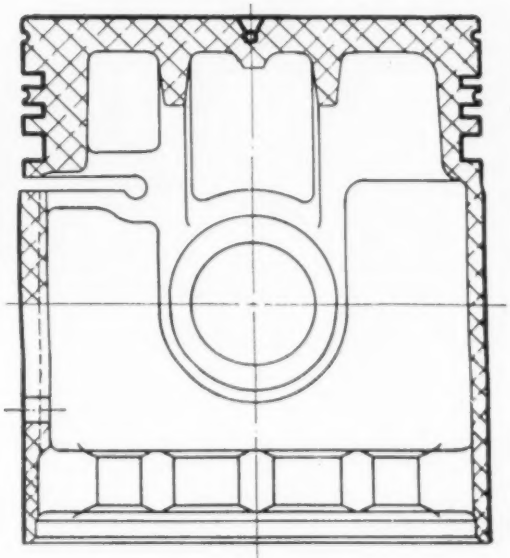
ASK **BAIRD** ABOUT IT!

# HIGH PRODUCTION TOOLING




## Here's a good example of ELLIPTICAL turning

### Aluminum alloy piston 490 pieces per hour



About 3¼" diameter

The piston is held in a mechanically operated expanding pin type chuck and centered on a finished land inside the piston skirt. Piston is rough and finish turned at skirt end; elliptical O.D.; DOME and 5 groove and dome centered; grooves chamfered.

## BAIRD No. 76H *automatic* CHUCKER

For high speed, repetitive production with maintained accuracy, this horizontal chucker is cutting costs in many leading automotive, aircraft and other plants. Both longitudinal and cross tool slides have micrometer adjustment and are independent; each of 6 spindles may vary speeds to suit operations. Automatic chucking permits operator to use both hands; automatic stop acts at end of cycle if work has not been unloaded or loaded in proper sequence.

If you wish to combine in a single automatic cycle such operations as turning, facing, drilling, tapping, grooving and chamfering . . . this is your machine . . . ask Baird about it!

*the* **BAIRD MACHINE COMPANY**
STRATFORD • CONNECTICUT

**AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS**

PRESENTING, *Americans* Sensational '53

# KING SIZE SELECTION OF DRILL BUSHINGS

VIRTUALLY ELIMINATES SPECIALS!


## *American's* NEW CATALOG

### *Gives You This KING SIZE Selection!*

Our new KING SIZE selection of standard types and sizes are immediately available to you through our fully stocked, exclusive Distributors — no waiting.

*Our new CATALOG was produced for your convenience.*

- **Contains the largest (King Size) selection of standard types and sizes available anywhere. 50% of your specials are now American's standards.**
- **All lengths are now standard. (No added charges)**
- **Simplifies selecting and ordering.**
- **Handy reference charts, pricing and technical data.**
- **Clearly organized and printed.**
- **Plastic coated—resists water, oil and grease smudges.**

Get Your FREE COPIES Today!

TRADE MARK

**AMERICAN DRILL BUSHING CO.**

5107 PACIFIC BLVD. LOS ANGELES 58, CALIFORNIA

PHONE LOgan 5-7147

SPECIALIZING ONLY IN DRILL JIG BUSHINGS

## How Norton brings you the "TOUCH OF GOLD" that adds more value to every grinding job

Grinding, the most universal, most basic of all production processes, is the true "Touch of Gold" that increases the usefulness — and the value — of every manufactured article. That's what happens every time Norton grinding wheels touch the grinding jobs YOU do.

*Here are the facts on how Norton leads the field in producing and improving the "Touch of Gold" for all industry.*

### FIRST IN SIZE

"Norton City", with its mile of buildings and thousands of workers is the largest single source of abrasive products — world headquarters for your "Touch of Gold".

### FIRST IN RESEARCH

Norton leads not only in developing new abrasives, bonds and processing techniques, but in cooperation with customers on grinding problems. From Norton laboratories have come such "Touch of Gold" exclusives as: New-Process Wheels, unequalled for uniformity, identical performance and long even wear . . . 32 ALUNDUM* Abrasive, one of the greatest developments in abrasive history . . . and NORBIDE* Abrasive, hardest material made by man.

### FIRST IN PRODUCT-RANGE

Norton offers you the most complete line. Norton ALUNDUM abrasives and CRYSTOLON* abrasives, together with Norton-developed bonds, make available hundreds of thousands of grinding combinations.

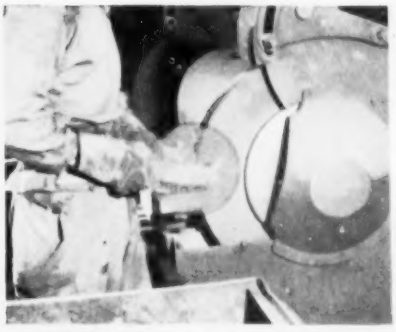
### FIRST IN SERVICE

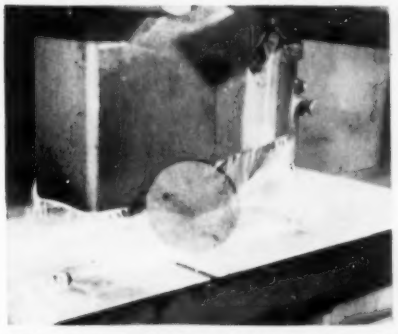
Your Norton Abrasive Engineer, skilled in every detail of abrasive manufacture and application, is ready to go into your plant, study your grinding problems and help you find the money-making answers.

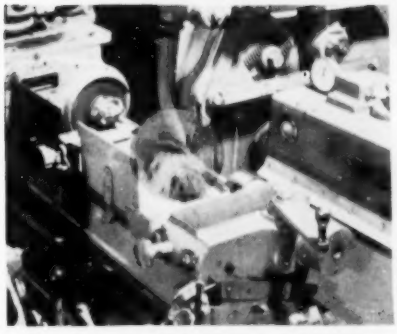
And Your Norton Distributor, with plenty of practical experience, can give you valuable help in selecting the right Norton wheels. He is your direct connecting link with the entire Norton organization — world headquarters for the "Touch of Gold" that means more profitable grinding for *you*. NORTON COMPANY, Worcester 6, Mass.

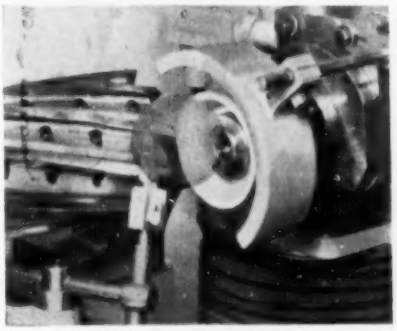
Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

## Make sure your grinding gets the top value-adding "TOUCH OF GOLD" — with Norton abrasive products









NORTON
ABRASIVES

*Making better products to make other products better*

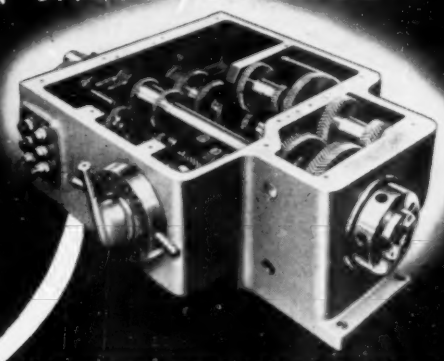
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NOT JUST ANOTHER LATHE

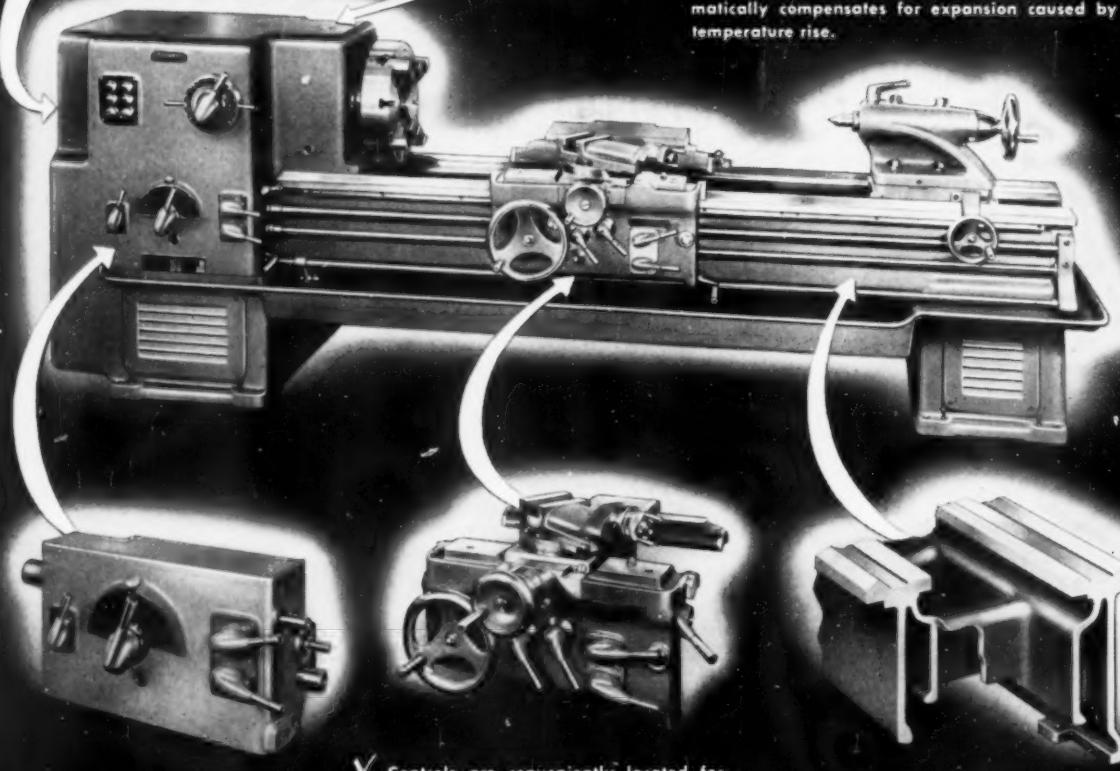
# but a Sidney Lathe!

## Check these features...

✓ Change gears rotate on anti-friction bearings and are mounted on fixed centers. Driving sheave is mounted on pre-loaded anti-friction bearings and is full floating on sleeve bolted to back of headstock. Drive shaft deflection is thus eliminated.



✓ All-herringbone geared headstock provides 32 pre-selective changes of spindle speeds through convenient dial control. Spindle and intermediate shafts are equipped with center bearings in addition to end bearings. Spindle mounting automatically compensates for expansion caused by temperature rise.





✓ Sidney's totally enclosed dial controlled gear box provides 60 changes of threads and feeds. All moving parts run constantly in oil.



✓ Controls are conveniently located for comfortable operation. Off-set compound—extra large micrometer dials—thumb screw dial lock. Notice also the four swivel hold-down bolts for added rigidity.



✓ Rigid four-wall bed construction with double cross girts spaced at 12" intervals. Casting is of semi-steel nickel mixture for close grain structure.

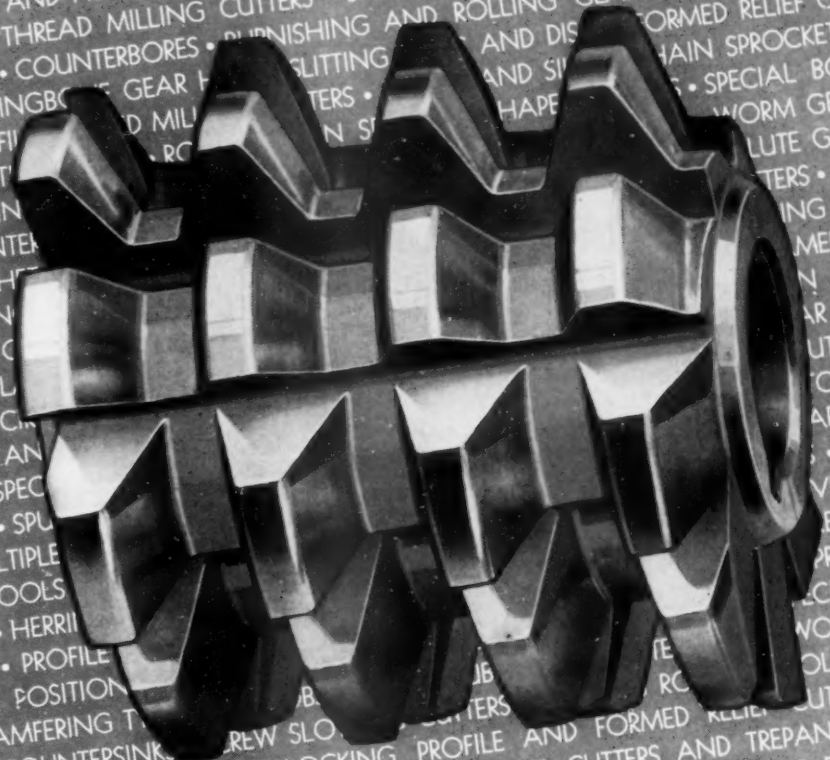
## SIDNEY MACHINE TOOL COMPANY • SIDNEY, OHIO

*Builders of Precision Machinery Since 1904*

FOR THOSE TOUGH *Special* JOBS

...DEPEND ON

# National Tool Co.



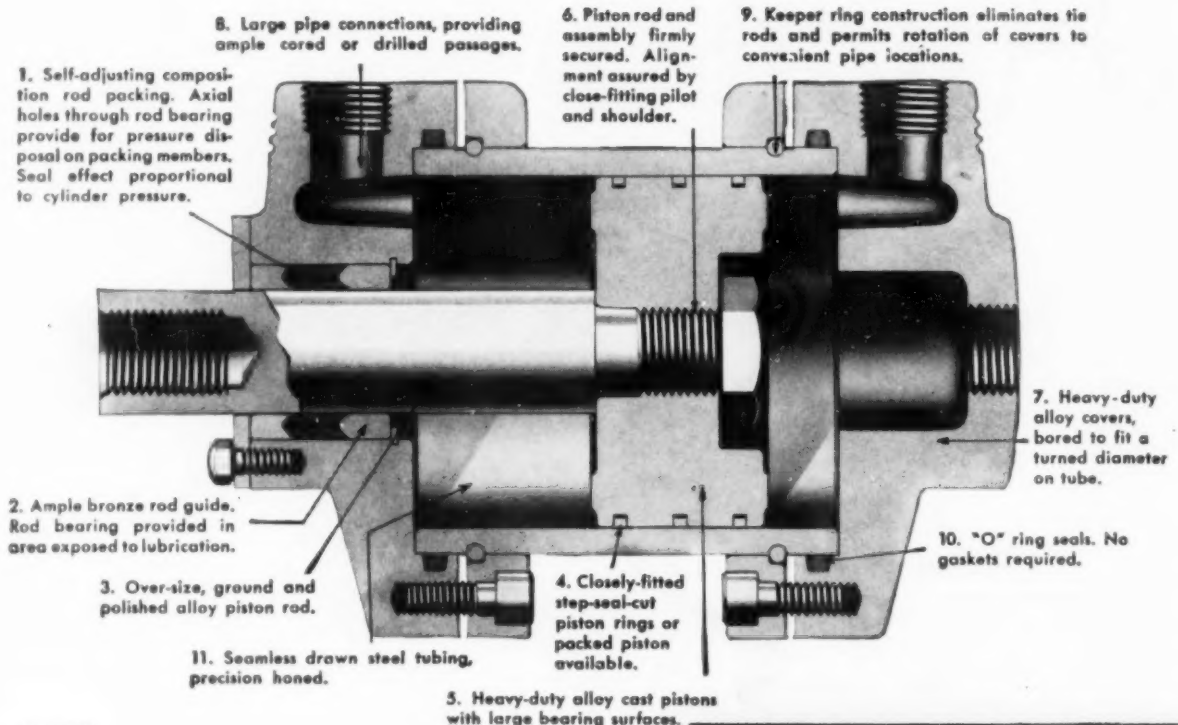
● Years of successful experience in *special* tooling and related production problems are yours for the asking. When the job requires *special* cutting tools call in your National Tool Co. representative. He is backed by more than 46 years experience in the engineering and manufacture of *special* cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

*Since 1905* engineers and manufacturers of high-quality special cutting tools for the metal-working industry

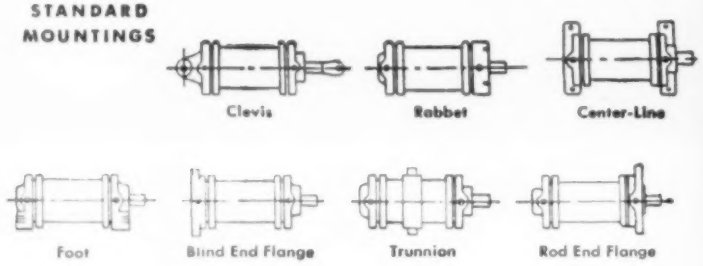
National Tools Cleveland

**National**
**TOOL CO.**
Cleveland 2, Ohio

# More Power to You




SEVEN STANDARD MOUNTINGS




## ..with RIVETT HYDRAULIC CYLINDERS

You'll find the performance of Rivett hydraulic cylinders close to foolproof. Designed with the utmost simplicity, they have no tie rods — keeper ring design permits covers to be rotated to convenient pipe connections and installation made in a minimum of space. External "O" rings are used as static seals to eliminate gaskets and assure leakproof operation. Sealing efficiency improves with increased pressure. Closely fitted automotive type piston rings reduce friction to a minimum.

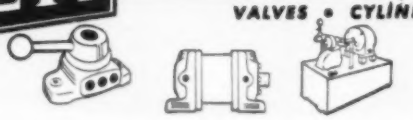
Available in three pressure ranges: to 300 P.S.I. maximum and 1500 P.S.I. maximum service with standard models. 3000 P.S.I. maximum and higher services furnished on application. Seven standard mountings, in 10 bore diameters, in any stroke up to 96", with standard size or 2:1 over-size piston rods, cushioned rod end, blind end or both. Special covers supplied. Send for Catalog Section 104.

**RIVETT LATHE & GRINDER, Inc.**
DEPT. TE-1, BRIGHTON 35, BOSTON, MASSACHUSETTS

RIVETT **furnishes a complete power package**

*VALVES • CYLINDERS • POWER UNITS*

Air and Hydraulic
All sizes and types



# What makes the SNORKEL PEN "breathe"?


Sheaffer's new Snorkel Pen created a sensation when it was introduced to the trade. Using air alone, the pen is emptied, cleaned and refilled through the filling tube of the Snorkel Pen with a one-stroke touch-down action.

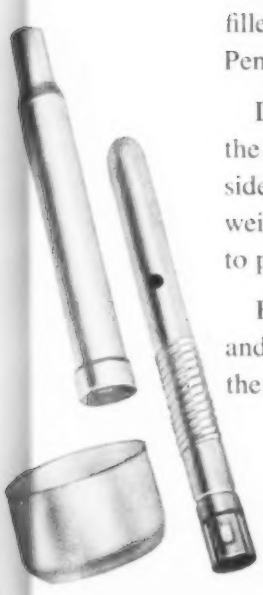
Designing the two brass "lungs" comprising the plunger-siphon mechanism called for considerable ingenuity. They must be light in weight, stiff and strong, easy to form and easy to polish and plate.

Formbrite* met all of these requirements—and more. With a metal thickness of only .0058", the 2" long cylinders are formed in multi-plunger presses in eight successive operations—*without annealing of any kind.*

Formbrite's superfine grain resulted in a harder, stronger, longer-lasting product with savings up to 50% in polishing costs.

Surprisingly, Formbrite, with all the plus values it offers over conventional drawing brasses, costs no more. See the reverse page for another application of Formbrite. And write for Publication B-39, addressing The American Brass Company, General Offices, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Limited, New Toronto, Ontario, Canada.

*Reg. U.S. Pat. Off.



Cups like this, blanked and formed in one operation from Formbrite strip $1\frac{11}{16}$" x .0058", are magazine-fed into multi-plunger presses. Eight successive operations produce the sleeves illustrated at top of page *without annealing*. Sleeves at left are finished, ready for chromium plating.

**Formbrite**
**is an**
**ANACONDA PRODUCT**
Made by The American Brass Company

# You can do this *better cheaper faster*

## IF THE METAL IS Formbrite

Since The American Brass Company introduced Formbrite* as a superior drawing brass, scores of stamping shops, polishing and plating rooms throughout the country have changed their thinking.

Comparative tests prove conclusively that the superfine grain structure of this specially processed forming brass means stamped and formed products that are stronger, harder, "springier" and more scratch-resistant. Yet the metal is so ductile that it can be readily formed, drawn and embossed.

Timestudies made of finishing operations have shown that a bright, lustrous finish can be obtained by a simple "color buffing" operation in half the time previously required.

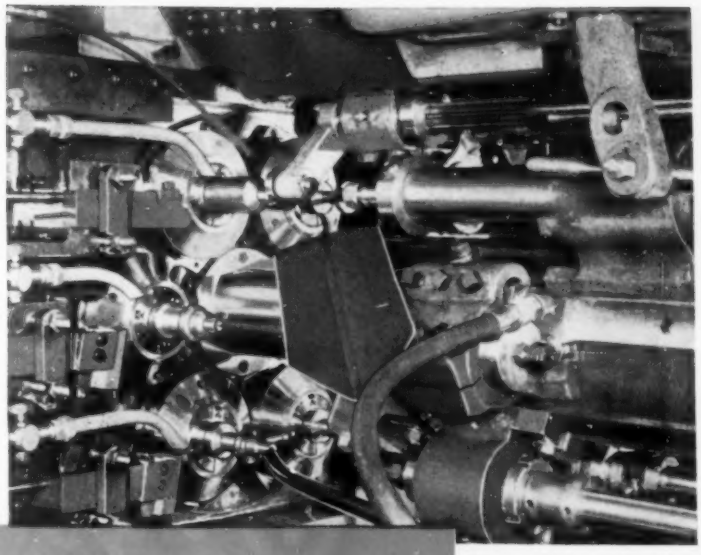
That's why we say you can do it *better, cheaper and faster* with Formbrite. Millions of pounds of Formbrite sheet and strip have been produced and economically fabricated into hundreds of different products. Want a sample—and more information? Address The American Brass Company, General Offices, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Limited, New Toronto, Ontario, Canada.

*Reg. U.S. Pat. Off.

In the pressroom of a supplier, the back of a military brush is blanked from Formbrite red brass strip.

Empire Brushes, Inc., Port Chester, N. Y. produces an extensive line of military and clothing brushes with Formbrite components. At right, a decorative band is being applied.

Formbrite
is an
**ANACONDA PRODUCT**
Made by The American Brass Company



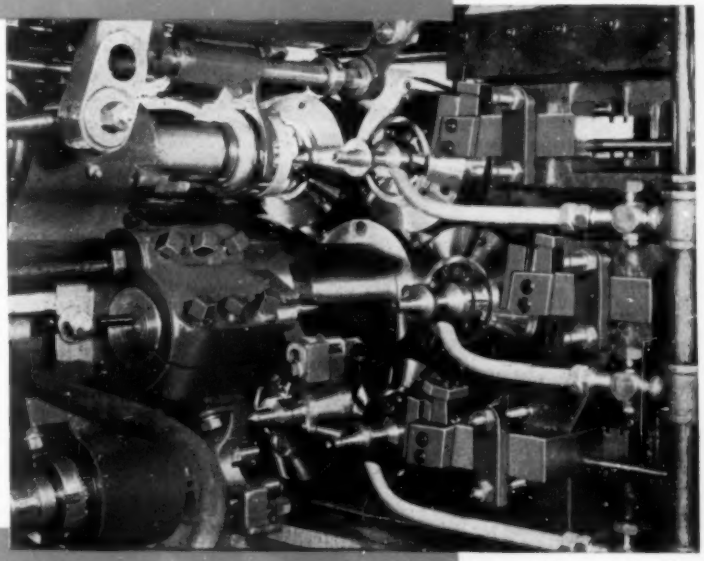
*Front Side of Tooling Area 1-5/8-SIX*

# THE FACILITY BEHIND THE NEWS

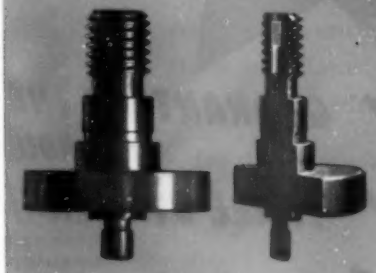
Case histories have appeal, whether they're about someone's time being bettered at a lathe or at an altar. Success likes success, and "misery likes company."

An "automatic's" case history is just an *end* of a *means* of machining facility. If you procure the right facilities, good case histories will result in *your* plant.

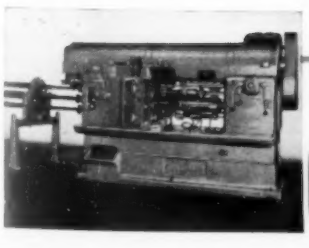
When selecting the best multi-spindle automatic facility for *your* needs, you will want to compare *all brands*. But you should have *full* information for a thorough comparison. You can have it on CONOMATICS.



*Rear Side of Tooling Area 1-5/8-SIX*



Cross drilling, cross milling, end broaching, end milling, and sawing operations are commonly performed by stopping the work spindles—often a costly procedure. For certain requirements, such as for the broached hole in the piece shown, CONOMATICS have performed all of the operations mentioned without stopping the work spindles.



*A Comparison of ALL Automatics is in favor of Cone*

**Conomatic** } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

WESSON'S

# New HUSKI-CUT"

## Finger Grip Holder

WRITE FOR BULLETIN No. 521


Use heavier feeds.

Use higher speeds.

Cut grinding cost.

Eliminate shank grinding.

Eliminate brazing of tips.

Cut replacement costs.

For heavy duty and extra heavy duty jobs.

Tested and proven on production lines throughout industry.

WCO

**GUARANTEED INDESTRUCTIBLE IN ORDINARY USE**

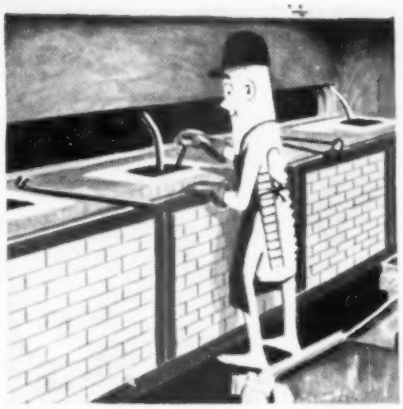
**THREE STANDARD TYPES**

**FORTY STANDARD SIZES**

ESSON COMPANY • FERNDALE, MICHIGAN

AFFILIATED WITH
WESSON METAL CORP.
LEXINGTON, KENTUCKY

# TAP-ODDITIES

At work — Pete gives heat treatment
To Bath Taps, to the right degree.
Such "hardening in the solid"
Builds uniformity!

At home — Pete "heat treats" Junior
With a common leather strap!
Such "hardening in the solid"
Builds "a chip off the old tap".

Proper heat treating of all Bath Tap blanks before the threads are ground is an important part of the Bath process — assured by constant check of procedure under the guidance of expert technicians in a well equipped metallurgical laboratory.

Hardening in the solid, produces blanks with ideal steel structure — no danger of over-heating thin and delicate threads or thread softness from under-heating.

Grinding of shanks, major diameter and flutes on precision centers, guarantees Bath Taps to be concentric. Polishing of the flutes is followed by the final operations — thread grinding and chamfering from the solid to insure uniformity and accuracy.

Insist on Bath Taps and Gages — carefully manufactured for those who prefer top quality and precise performance.

INSIST ON BATH TAPS
— PROFIT BY THEIR
PLUS — PERFORMANCE

JOHN BATH CO. INC · WORCESTER · MASS

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

**JOHN BATH CO. INCORPORATED**
**28 Grafton St., Worcester, Mass.**

*"— and they chopped down the Old Pine Tree."*

**Woodsmen Use Marking Devices!**

When a forester indicates a tree is to be cut by the lumberjack he usually paints a mark just above the ground and another about breast-high, indicating it is to be cut for lumber purposes. If the tree is diseased he usually marks it with an X or other suitable device, indicating that it is to be cut for destruction or firewood.

# CADILLAC MARKING DEVICES

**are Designed for**

**ALL MARKING PURPOSES**

Whatever your requirements, from small Hand Stamps to Pneumatic, Hydraulic or especially created Marking Machinery, CADILLAC STAMP COMPANY stands ready to supply or design and build to meet your needs.

**INTERCHANGEABLE TYPE and TYPE HOLDER SETS**

The faces of CADILLAC Steel Letters and Figures combine a high degree of hardness with toughness, insuring especially long life. All CADILLAC Marking Type and the recess in Type Holders are made in standardized dimensions. This means that type will fit interchangeably in hand holders, marking machine holders or punch press holders designed for the size type specified. Due to the precision adhered to in manufacturing, they will when assembled in any holder make impressions in perfect alignment.

**HEAVY BEVEL HAND STAMPS**
CADILLAC Heavy Bevel Letters and Figures combine a high degree of hardness with toughness, insuring exceptionally long life.

**HAND STAMP SYMBOLS**
A system of distinctive symbols for inspection and confidential markings. Write for Symbol Chart.

**CADILLAC STAMP CO.**
FACTORY and OFFICES
17313 RYAN ROAD • DETROIT 12, MICH.

USE READER SERVICE CARD; INDICATE A-1-190-1

ARROW TOOL & REAMER CO., Established 19[illegible]

SPECIAL CUTTING TOOLS FOR 36 YEARS

• SUBLAND DRILLS
• MULTIPLE FLUTED TOOLS •

ARROW produces Special Tools Quickly— Economically
Carbide or H. S. Steel
Send your prints today or write for details

**ARROW TOOL & REAMER CO.**
418-422 LIVERNOIS AVE. • DETROIT 9, MICH.

USE READER SERVICE CARD; INDICATE A-1-190-2

**Punches and Dies**

**. . . for foot and power presses**

Standard Punches and Dies of all sizes and shapes in stock—or made promptly to order. Also Adaptors and Die Shoes to convert your press. For power, foot or hand operation.

Round, square, rectangular, slotting, notching, louvre, angle, multiple, knock-out and other shapes. Precision made from high grade tool steel. *LET WARD PUNCH AND DIE FOR YOU!*

• *Send for free illustrated catalog No. 152 AB—NET PRICE SHOWN! What are your punch and die needs?*

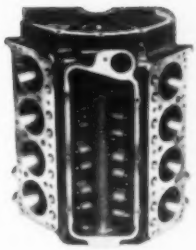
**WARD Machinery Co.** 564 West Washington **Chicago 6**

USE READER SERVICE CARD; INDICATE A-1-190-3

To Obtain Further Information About Advertisers, Trade Literature or Tools of Today Appearing in this Issue of The Tool Engineer, Use the Handy Readers Service Card on Page 131.

Performs 180 operations in 43.5 seconds. Drills, spot-drills, rough-bores, c'bores, c'sinks, and reams. Includes 360° rotating fixture for removal of chips at station No. 11, and automatic gauge of drilled holes at station No. 17.

UNIT No. 1



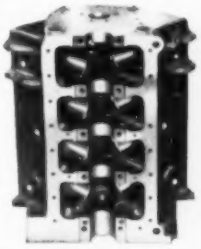
*Capacity...*

**80!**

**CYLINDER BLOCKS AN HOUR**

**379!**

**OPERATIONS**



# GREENLEE

## TRANSFER MACHINES

When you see these big Greenlee transfer machines working — turning out a tremendous quantity of work so smoothly and easily — you realize the qualities that make them great. Here is power, precision, durability, and a vast multiplicity of operations in a compact, integrated production line. Here is modern mass-production for component parts in its most successful form.

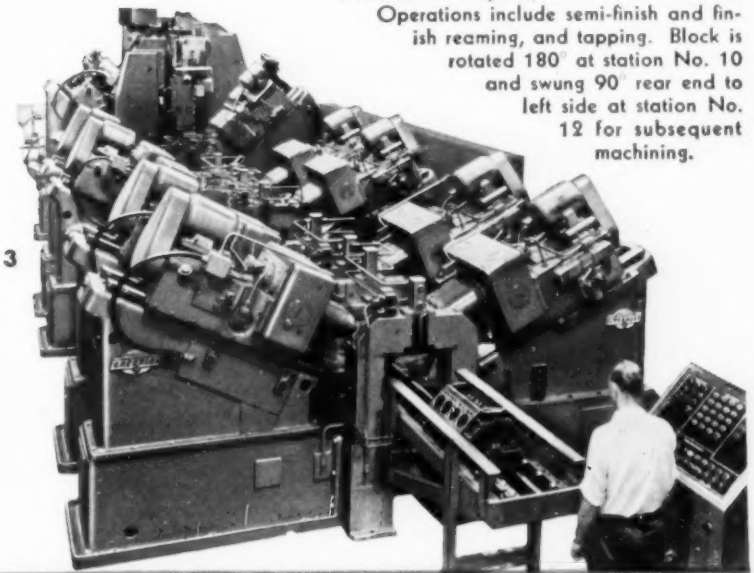
Concrete evidence of our experience and capability in designing and building Transfer Machines is exemplified with installations like this three-unit production line, now at work for a leading automotive concern.

UNIT No. 2

Performs 76 operations in 43.8 seconds. Drills, c'sinks, c'bores, and trepans. Tilts part at station No. 1 to 180° for subsequent machining. Automatically gauges and cleans drilled holes at station No. 20.

Performs 123 operations in 35.5 seconds. Operations include semi-finish and finish reaming, and tapping. Block is rotated 180° at station No. 10 and swung 90° rear end to left side at station No. 12 for subsequent machining.

UNIT No. 3



PRODUCTION MACHINERY

**GREENLEE**

**GREENLEE BROS. & CO. 1981 MASON AVE., ROCKFORD, ILL.**

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

another reason why more threading shops say—

# "we've standardized on VERS-O-TOOL

You probably know Vers-o-tools as the self-opening, precision die heads that feature the circular-ground thread type of chaser—

- **the kind that give as many as 200 grinds.**
- **the kind that are micrometer gauge checked on their blocks before and after each grind, so that the first piece cut will be right—no removal of head, no fussing to get size, no scrap.**

Vers-o-tools are the most versatile tools, produce more per dollar of investment—cost less. That's why so many experienced users say, "We've standardized."

**How about the shorter runs?**
Simply substitute the Adjustable Blade Chasers and Blocks for circulars in the same Vers-o-tool head. They also have ground threads and the cost is less.

**Hollow Milling?**
End forming and turning cutters, both circular and blade-types, cut three times faster than single point tools, snap open and leave no marks, also knurls and burnishing rolls.

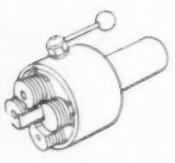
**Interchangeable?**
All chasers, mills or rolls, circular or blade-type, are, with their blocks, used in both revolving and non-revolving Vers-o-tools, die size for size.

**DT-52 is the complete new catalog on Vers-o-tools and Namco Solid and Collapsible Taps.**

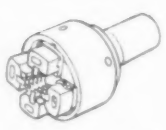
## *Time Saving* ... that's it!

**Change chasers in less than 2 minutes—just lift reset handle, slide back the hood and they drop out—no screws, no adjustments, patented.**

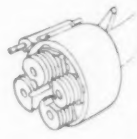
**Time saving—that's it! . . . And that's one big reason why makers of smooth class 3 high pressure threads whose 'round-the-clock schedules often run into millions of a kind STANDARDIZE on Namco Vers-o-tools.**



Style DS Vers-o-tool (Non-revolving Type) 10 Sizes, ⅜"—6½".



Style DR Vers-o-tool (Revolving Type) 13 Sizes ⅛"—6½" Shown with Adjustable Blade Chasers 7 Sizes, ⅛"—2".



Style DBS Vers-o-tool (for B&S Automatics) 3 Sizes, ¼"—⅝".

24-HOUR DELIVERIES ON MOST STANDARD STOCKABLE NC AND NF CHASERS AND BLOCKS — ALSO NATIONAL TAPER PIPE AND DRY SEAL

**The NATIONAL ACME CO.**
170 EAST 131 STREET, CLEVELAND 8, OHIO.

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing.

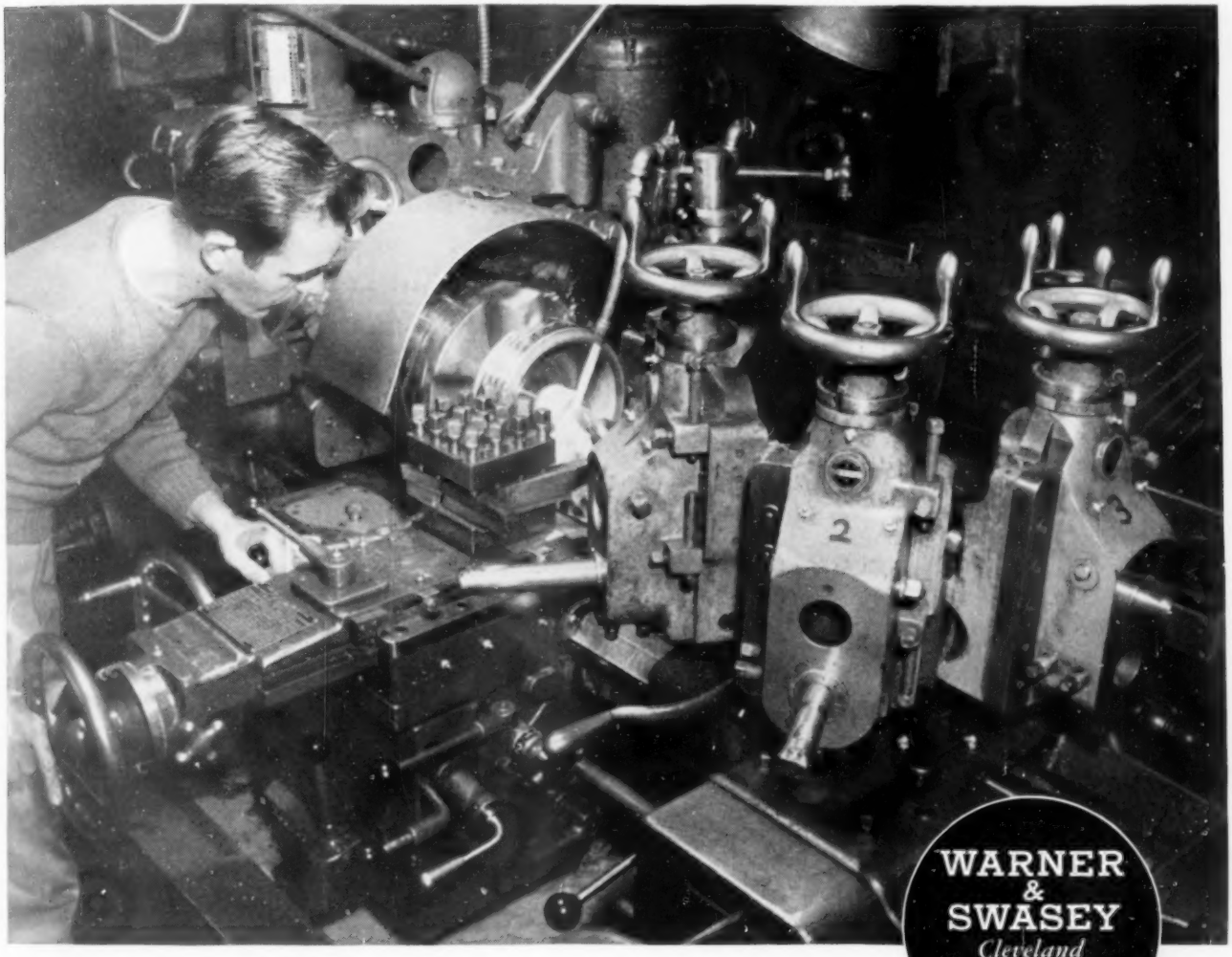
# JOB LOTS... LARGE OR SMALL
## No Problem at American Locomotive

WHEN YOU must machine a wide variety of jobs in various lot sizes—sometimes even single pieces—you must use turret lathes on which jobs can be set up quickly, changed with little down-time. American Locomotive has found they can handle these jobs *profitably* on Warner & Swasey Turret Lathes set up with Standard Universal Tooling.

At the Diesel Engine Division in Auburn, New York, six different model Warner & Swaseys are used on a variety of jobs ranging from lots of 6 to 500 pieces. Repair parts are also handled on these machines. These turret lathes turn everything from gray iron castings to tough alloy steels and hold limits of .0005".

American Locomotive experience proves jobs can be switched quickly on these Warner & Swaseys. Warner & Swasey power handles heavy multiple cuts. Warner & Swasey speed permits most efficient use of carbide tools. Rigid Warner & Swasey design guarantees lasting accuracy.

Warner & Swasey Turret Lathes have proved themselves profitable in handling precision jobs of many different kinds in thousands of plants—on job lots, large or small. So before you invest in any machine tools, call in your nearest Warner & Swasey Field Representative and find how Warner & Swasey can improve production and build profits for you.



*A steel forged drive gear for Diesel locomotives being machined on a Warner & Swasey 1-A Turret Lathe. Limit: .0005" on O.D. of hub. Pieces in lot: 20. Repair parts for locomotives are also made on this machine.*

WARNER & SWASEY
*Cleveland*
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

# You Can CUT COSTS in Cutting SHEET / PLATE / STRUCTURALS / ROD-BAR / TUBING / EXTRUSIONS with STONE HIGH-SPEED CUTTING MACHINERY

**LOOK AT THESE TYPICAL CUTTING TIMES**

| | | |
|---|---|---|
| ALUMINUM | 2½" Dia. Rod | 12 Seconds |
| ALUMINUM | 1" Plate | 5 ft. per min. |
| ALUMINUM | 2" Dia. Tube | 3 Seconds |
| BRASS | ½" Dia. Rod | 2 Seconds |
| COPPER | 1¼" Dia. Rod | 5 Seconds |

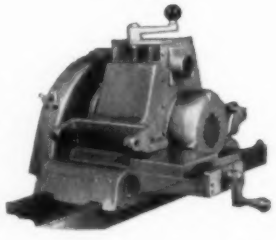
*Models Available for ALL SHOP NEEDS!*

MODEL M-75

A floor model, 2½' x 4' equipped with full 7½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2½" — pipe and structurals up to 4". Can be equipped for wet cutting.

MODEL SS-20

Operates on guided rails for cutting larger structural steel, plate, sheet, with cuts up to nine feet in length. Cuts wet or dry.



MODEL M-14

32" x 34" Bench Model. This mighty little brute, with full 3½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2" — pipe and structurals up to 2½". Two models — straight cut-off and swivel head for angle cutting to 45°. Legs available.

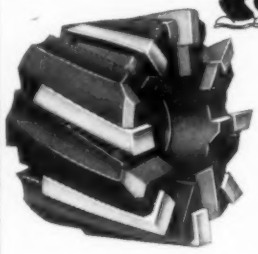

*For complete information write to*

**STONE MACHINERY CO., INC.**
Fayette St. Manlius, N.Y.

USE READER SERVICE CARD; INDICATE A-1-194-1

# APEX TOOLS

INSERTED-BLADE MILLING CUTTERS AND SINGLE-POINT TOOLS FOR ALL METAL-CUTTING NEEDS

"Apex" inserted-blade milling cutters incorporate the adjustability and economy necessary in these tense times when every ounce of material and every minute of time are vital.

The famous "Apex Shankless, Adjustable, Serrated design offers you holders for every metal removing job. Forty tool bits to choose from, all interchangeable without regrinds. "Apex" bits fit holders of other make. Check with us on this. Carbide tips if desired. Send for catalog.

**APEX TOOL & CUTTER CO., INC.**
SHELTON 16, CONNECTICUT

USE READER SERVICE CARD; INDICATE A-1-194-2

Buol

# HELICAL SPIRAL TAPER PIN REAMER

*featuring*

**Continuous change in lead angle to compensate for continuous change in diameter.**

- This feature insures uniform depth of radial undercut (shear) on the entire length of the taper and provides uniform relief at all points on the diameter.
- In stock for immediate delivery sizes #6/0 thru #10. Made promptly to order sizes #11, 12, 13, and 14.
- Backed by 27 years of manufacturing reamers exclusively. We also make Stub Reamers, Die Clearance Reamers, and Special Reamers to your exact specifications.

MANUFACTURERS' AGENTS: Exclusive territories open outside of New England and metropolitan New York. Write us.

**THE BUOL MACHINE CO.**
REAMERS EXCLUSIVELY
PARK & MEADOW NEW BRITAIN, CONN.

USE READER SERVICE CARD; INDICATE A-1-194-3

Miller — HIGH PRESSURI

# HYDRAULIC CYLINDERS

**HA… CHR…ME PLATED PI…ON RODS**
Pr… Scratch-Damage, Nic… and Rust

**FOUR WEEK DELIVERY**
*(dependent upon your allowing more time on non-rush orde*

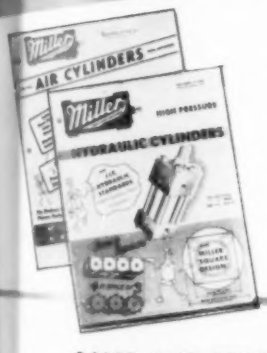
**to meet you *RUSH* cylinder requirements**

on all Standard Models exce
Models 81 and 82 ..... 6 wee
Water Fitted Models ..... 7 wee
Precision Seal and Other "Specials" ..... 8 wee and long

**SOLID STEEL HEADS, CAPS and MOUNTINGS**
Eliminate Breakage

**DIRT WIPER SEALS**
Protect Rods, Seals, Bushings

Standard Leather Cup Seal Assembly Shown Is Interchangeable With Miller Standard Piston Ring Piston Assembly




WRITE FOR CYLINDER BULLETINS H-104 and A-105

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

**MET J. I. C. HYDRAULIC STANDARDS** years before their adoption in 1949.

**SPACE-SAVING SQUARE DESIGN** originated by Miller in 1945.

*Visit Our Booth No. 1016 January 1953 Plant Maintenance Shou*

**SALES AND SERVICE FROM COAST TO COAST**

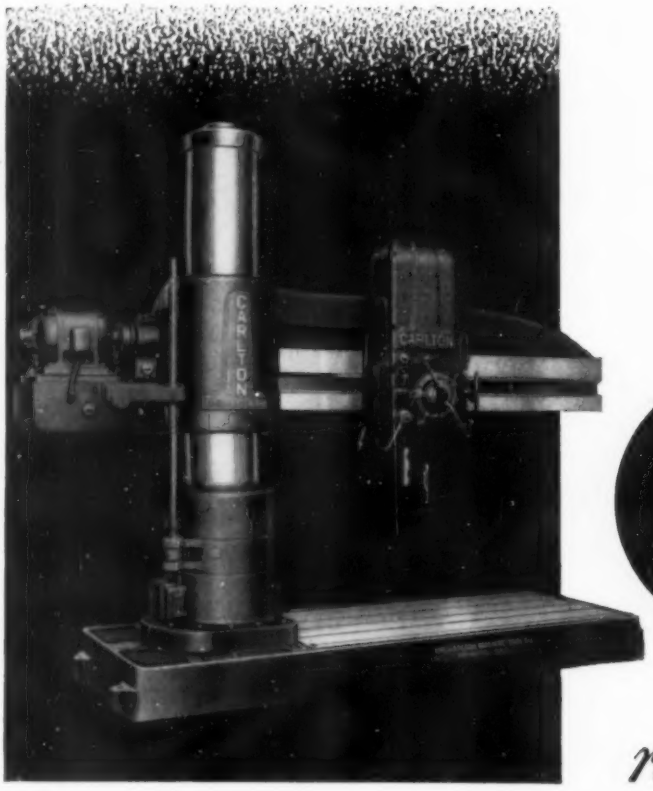
CLEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND RAPIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS • MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES • SAN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • TORONTO, CANADA and OTHER AREAS

Miller

**MILLER MOTOR COMPAN**

2010 N. HAWTHORNE AVE . MELROSE PARK, ILL

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULA… COUNTERBALANCE CYLINDERS




*count on*

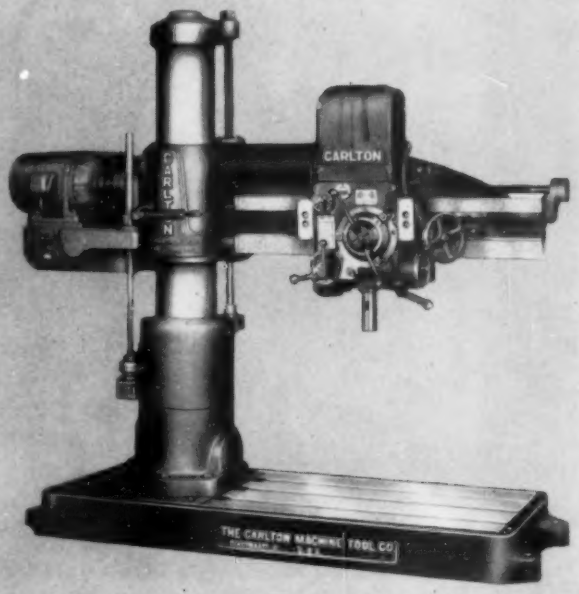
# Carlton

*for all your radial drill requirements*

**In the broad Carlton line** there's a radial that will drill and tap any holes you may have from ¼″ to 10″ diameter. Between the 5A with 26″ column and 12′ arm . . . and the 1A with 9″ column and 3′ arm . . . there are five basic models and many different column and arm sizes. With this variety you can buy exactly the right size Carlton for your requirements.

**And with the numerous types** of bases and tables available with Carlton Radials, you'll have all the hole production facilities you've always wanted.

**Add to this** the many Carlton design and construction advantages . . . and you'll find you can count on Carlton for capacity, production flexibility and performance. Why not send today for full particulars?




**THE CARLTON MACHINE TOOL CO.,** CINCINNATI 25, OHIO, U.S.A.

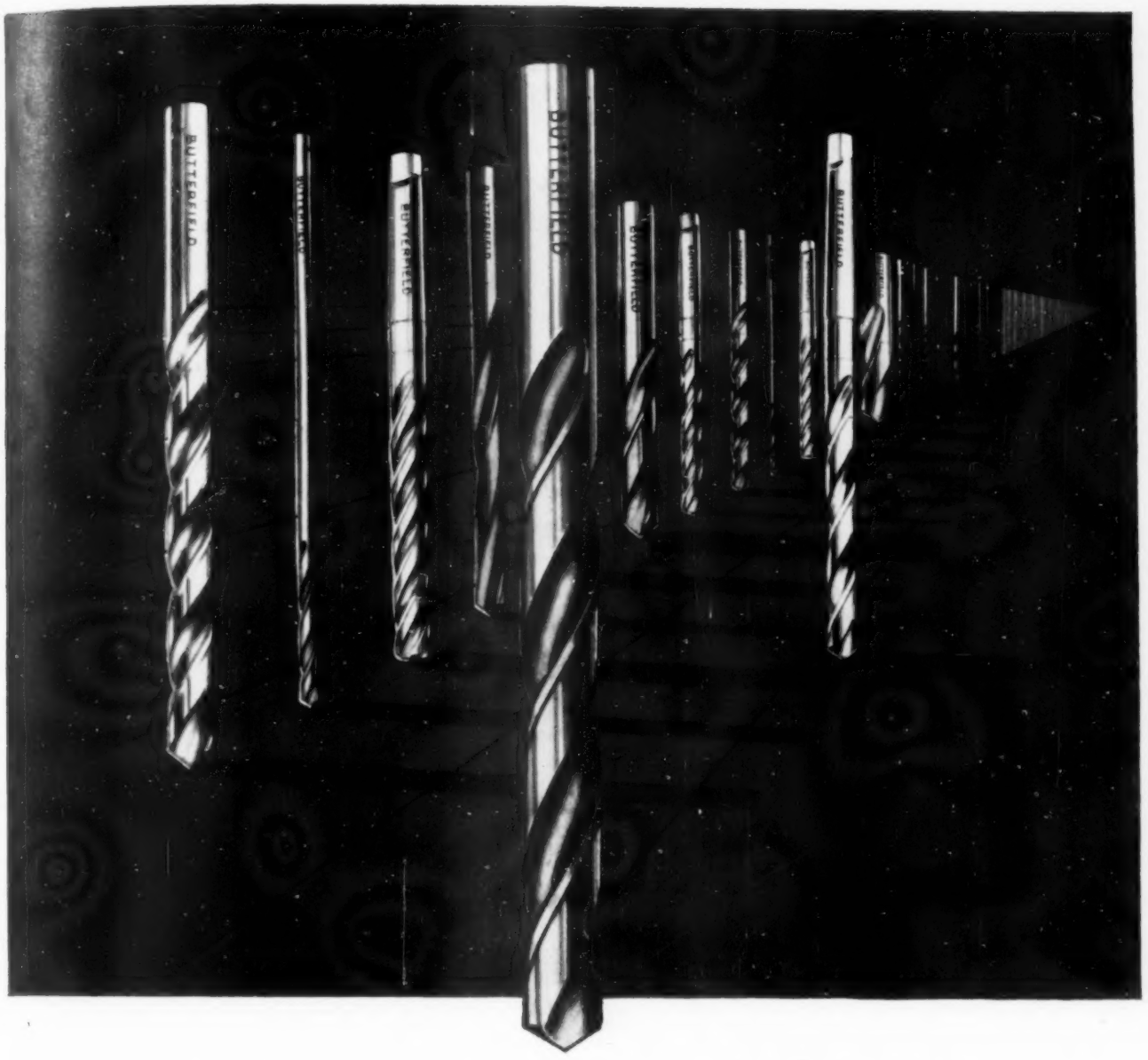
Gentlemen: Please send me bulletin(s) checked below:

NAME _____

ADDRESS _____

CITY _____ STATE _____

- ☐ 1A — 9″ col. 3′–4′ arms; 11″ col. 3′–4′–5′ arms
- ☐ 3A — 13″ col. 4′–5′ arms; 15″ col. 4′–5′–6′ arms; 17″ col. 5′–6′–7′ arms
- ☐ 4A — 19″ col. 6′–7′–8′ arms
- ☐ 5A — 22″ col. 7′ to 10′ arms; 26″ col. 8′ to 12′ arms




# NEW RECRUITS...100% INSPECTED
# ...JOIN THE BUTTERFIELD DIVISION!

**Butterfield Twist Drills Are Here — For Every Purpose. The Latest Additions To This Famous Line.**

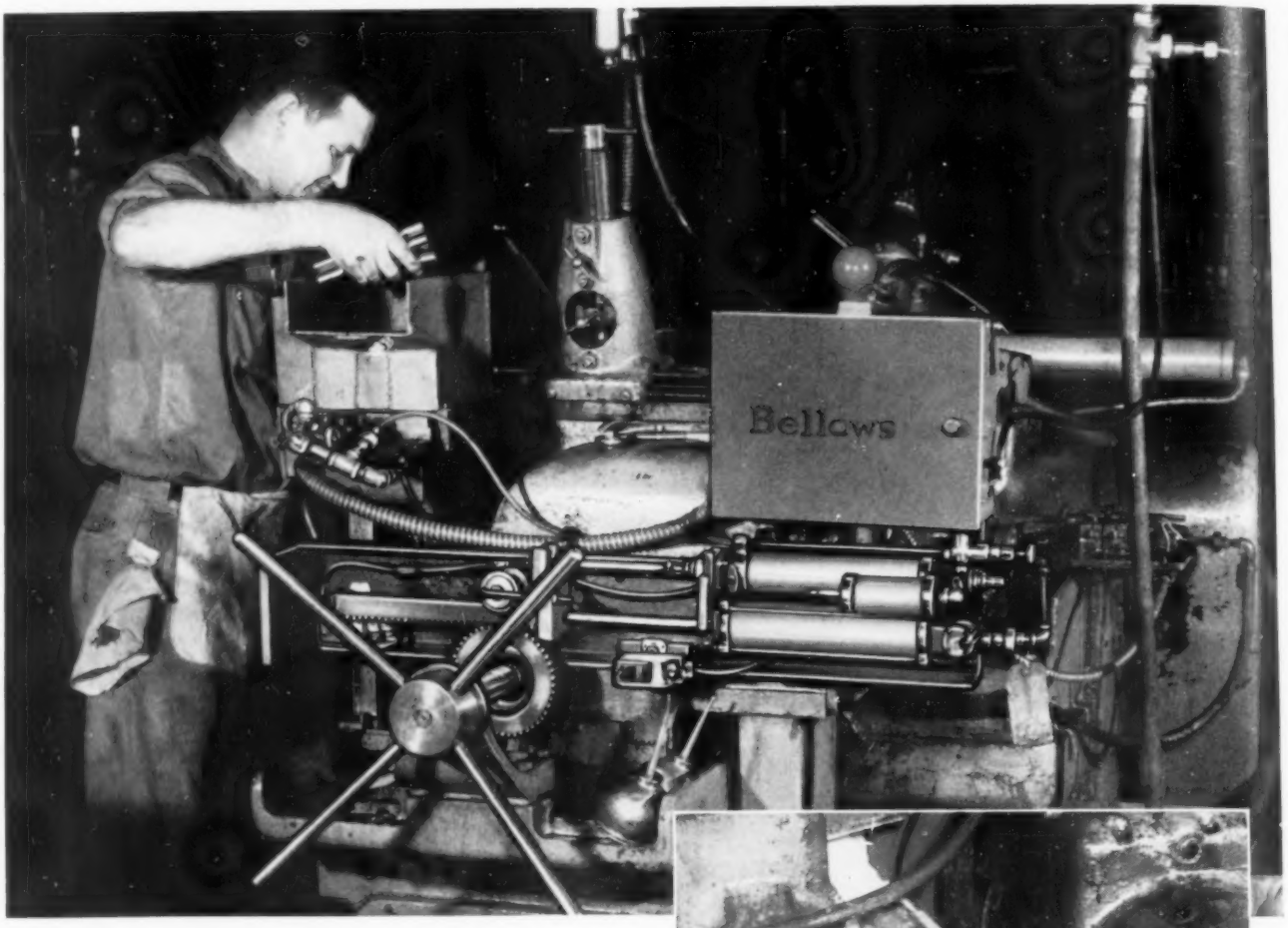
Now you can get twist drills of the same high quality as the Butterfield taps, dies and reamers that have served you so well over the years. As with all Butterfield products, each drill is individually inspected for accuracy and quality — 100% inspection for 100% satisfaction. Union Twist Drill Company, Butterfield Division, Derby Line, Vermont. *In Canada:* Rock Island, Quebec.

**BUTTERFIELD**
**THE 100% INSPECTED TOOLS**
*Every Tool Individually Inspected*
TAPS • DIES • REAMERS • SCREW PLATES • TWIST DRILLS

Bar stock being tested for microstructure . . . one step in Butterfield's 100% inspection.

***SEE YOUR NEARBY BUTTERFIELD DISTRIBUTOR FOR PROMPT DELIVERIES AND SERVICE***

# AIR-POWERED INFEED GIVES 43% MORE PRODUCTION— BETTER QUALITY CONTROL—IN CENTERLESS GRINDING




CENTERLESS grinding is a critical operation. Infeeding by hand requires a keen eye, a sure touch, and an instinctive sense that comes only with years. Scrap runs high at best — and production . . . well you take what you get, and try to be happy about it.

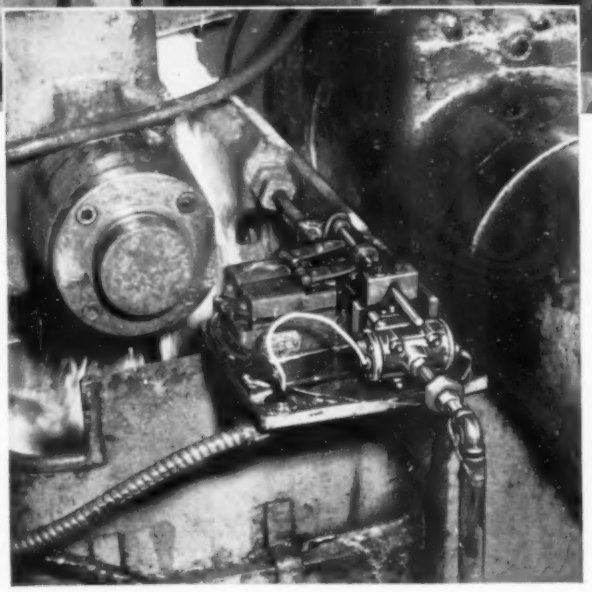
But better production is possible. Try infeeding with Bellows "Controlled-Air-Power" and watch scrap drop. Add an air-powered work positioner and ejector and watch production rise. Put on a hopper feed, and see production jump as much as 40%.

We'd like to tell you more about Bellows "Controlled-Air-Power" and what it is accomplishing in setting new production records for centerless grinders . . . and for drill presses, milling machines and other machine tools.

Write for free Bulletins CL-30 and BGF-5A. Address, The Bellows Co., Akron 9, Ohio, Dept. TE-153.

**The Bellows Co.**

**AKRON, OHIO**



*Production in grinding a 57/64" diameter, 7" long counter gear shaft for the transmission of one of America's best known cars jumped 43% when Bellows "Controlled-Air-Power" went on the job. Scrap dropped to a new low. Operator fatigue was no longer a factor. (Protective covers removed for photograph.)*

1383

# CUT BETTER THREADS AT LOWER COST!

## RADIAL

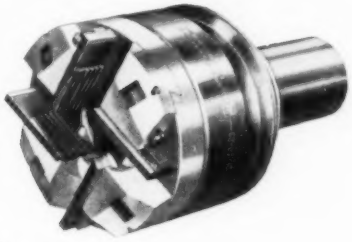
These Die Heads, with *ground thread* chasers, do an outstanding job on large or small lots, in pitches ranging from extremely fine to coarse multiple Acme.

They have an over-all capacity of from No. 8 to 4¼".

They require no more than the proper chasers to cut either right- or left-hand threads.

They are easy to install and simple to handle. For almost half a century of continuing development and improvement, J & L Dies and Chasers have been the answer to threading jobs throughout the world.

## TANGENT



**J & L** Tangent Chaser Die Heads, with *ground thread* chasers, are rugged, dependable, time-tested tools. They are production engineered to produce better threads at speeds limited only by the material being threaded. Capacities are from No. 4 to 2".

There is a J & L Tangent Chaser Die Head engineered for your requirement. Stationary types are available for turret lathes or any machine where the tool does not turn. Revolving types are for automatic screw machines, drill presses, threading machines, or any machine where the tool is held in a live spindle.

## For B&S AUTOMATICS and small Turret Lathes

For high production, quality threading on B & S Automatics and small turret lathes. Their simple design and careful workmanship assure repetitive accuracy with long runs between chaser grinds.

No. 16-S is for use on B & S No. 00, 00G, 0 and 0G and small turret lathes. They have "DUALIFE" radial type *ground thread* chasers with two cutting edges for maximum use between grinds.

No. 18-S is for B & S No. 0, 0G, 2 and 2G and the No. 19-S, with wider range, for B & S No. 2 and 2G. These dies use *ground thread* tangent type chasers.

P.S. → *Write to Dept. 710 for catalog!*

# JONES & LAMSON

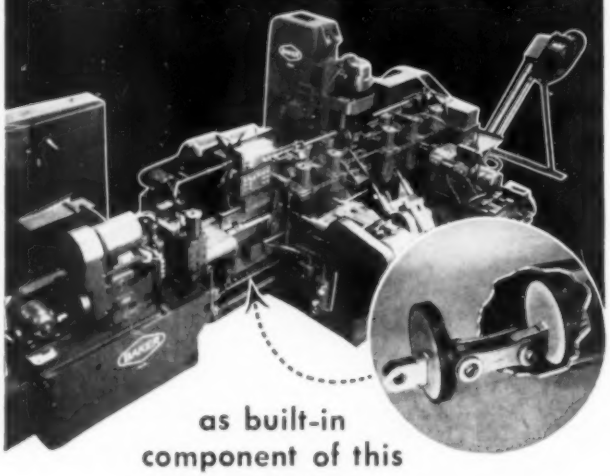
*Machine Tool Craftsmen Since 1835*

JONES & LAMSON MACHINE CO., 518 Clinton St., Dept. 710, Springfield, Vt., U.S.A. J&L® DIE HEAD DIVISION

# Hapman

## TUBULAR CHIP CONVEYOR

*helps speed production*



as built-in component of this cost-cutting

## BAKER MULTI-OPERATION MACHINE

With built-in Hapman Tubular Conveyors, alert machine tool designers are getting faster chip removal, allowing faster operating speeds and greater production.

Take this Baker Multi-operation transfer-type Machine, for example. Hapman rubber-flighted sealed-pin Chain Conveyors carry off chips resulting from five distinct operations. On other applications, Hapman Conveyors carry grinding sludge, iron, steel and aluminum chips, welding flux, and dozens of other abrasive and corrosive materials.

Investigate Hapman advantages — as related to equipment *you* build or buy. It may pay you big dividends in speed and efficiency. Hapman Conveyors are working for many of America's largest firms . . . a proof of practical, dependable performance.

*Write for your copy of Hapman Catalogue TE-153 for details and applications.*


**Hapman CONVEYORS, INC.**

DIVISION HAPMAN-DUTTON COMPANY

KALAMAZOO MICHIGAN

USE READER SERVICE CARD; INDICATE A-1-200-1

This


## DIE BOOK

CONTAINS CONDENSED PRACTICAL AIDS FOR EXPERIENCED

## DIE MAKERS

***Answers to Over 1000 Practical Die Problems With Use of Direct Reading Tables and Formulas***

ALL IN ONE COMPACT HANDBOOK . . . direct answers to die problems. Saves time. Eliminates mathematical calculations. Avoids costly errors. Contains invaluable formulas and tables for quick reference.

Formulas and Direct Reading Die Tables on the following types of dies: Bending and Forming Dies, Blanking Dies, Drawing Dies, Square and Rectangular, Drawn Shells, Miscellaneous Tables and Charts.

*Write for Bulletin 77—Money Back Guarantee—Ten Days' FREE Examination.*

**DIE TECHNIQUES**

**Publishers: 5005 W. Lake St., Chicago 44, Ill.**

Please send on approval Condensed Practical Aids for Die Engineers, Designers and Die Makers.

☐ Enclosed $3.50 for one book
☐ Enclosed ($3.00 each for 6 or more)

*Name* _____

*Firm* _____

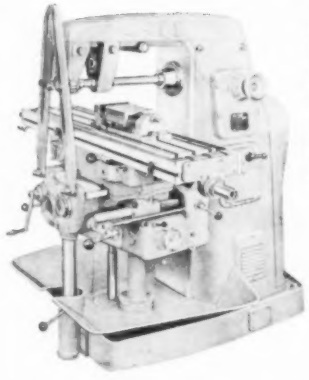
*Address* _____

USE READER SERVICE CARD; INDICATE A-1-200-2

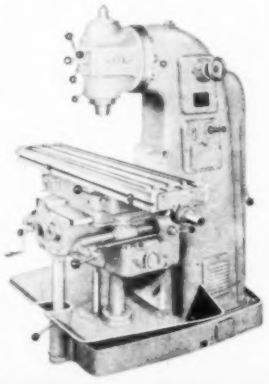
## HERCULES #2 PLAIN, UNIVERSAL & VERTICAL *MILLERS*

PRECISION MILLING MACHINES

For Toolroom & Production Work



These HERCULES #2 Milling Machines have hardened and ground gears, power rapid traverse in all directions, 12 spindle speeds and feeds, separate oil circulation for main gearbox and feed gearbox, motor in the base, spindles have #50 Standard Milling Machine Taper. Knee rigidly supported by round outboard sliding column.



Work table overall.....12" x 51"
Automatic long feed in.....32
Spindle speeds RPM.....40-900
Main motor HP.....5
Feed motor HP.....1

**IMMEDIATE DELIVERY**

Full details will be sent upon request

**PARKER MACHINE COMPANY, INC.**

158 PIONEER STREET • BROOKLYN 31, N. Y.
TEL. TRiangle 5-2103 & 2157

USE READER SERVICE CARD; INDICATE A-1-200-3

Industry's Favorite

# DIE STEELS

for

# COLD WORK

SELECTED FOR

**Machinability**

**Hardenability**

**Dimensional Stability**

**Wearability**

## COLONIAL NO. 6

**NON-SHRINKABLE**

**Oil hardening. Combines machining ease with low hardening temperature and excellent stability. Very widely used.**

## OHIO DIE

**Air hardening. High carbon, high chromium alloy with exceptional resistance to wear, providing long die life.**

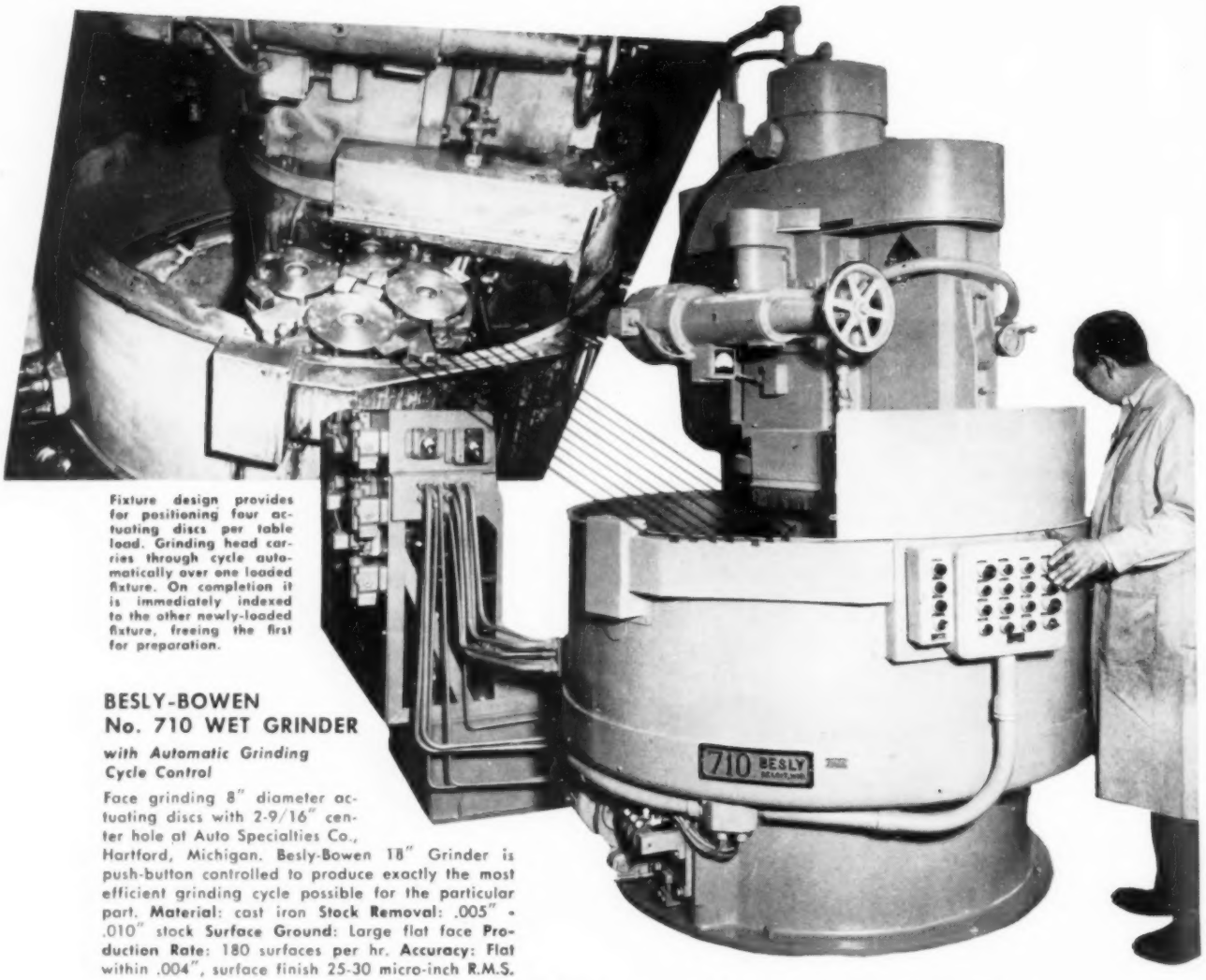
## AIR HARD

**Air or oil hardening. A fine steel for intricate dies where movement cannot be tolerated.**

These leading First Quality Die Steels cover the field of your most exacting cold work requirements. Specify them *by brand*, and get the distinctive performance built into each by complete control of manufacture—from our exclusive melting formulas to the last laboratory and production checks of the finished steels. ● Do you have our 24-page Cold Work Die Steel Catalog?

**Vanadium-Alloys**
STEEL COMPANY
LATROBE, PA.

COLONIAL STEEL DIVISION • ANCHOR DRAWN STEEL CO




Fixture design provides for positioning four actuating discs per table load. Grinding head carries through cycle automatically over one loaded fixture. On completion it is immediately indexed to the other newly-loaded fixture, freeing the first for preparation.

**BESLY-BOWEN**
**No. 710 WET GRINDER**
***with Automatic Grinding Cycle Control***

Face grinding 8" diameter actuating discs with 2-9/16" center hole at Auto Specialties Co., Hartford, Michigan. Besly-Bowen 18" Grinder is push-button controlled to produce exactly the most efficient grinding cycle possible for the particular part. **Material:** cast iron **Stock Removal:** .005" - .010" stock **Surface Ground:** Large flat face **Production Rate:** 180 surfaces per hr. **Accuracy:** Flat within .004", surface finish 25-30 micro-inch R.M.S.

# No IDLE Machine Time

Many plants have accepted as unavoidable a grinding operation in which the operator merely stands by to supervise the grinding cycle, then busies himself while the machine is idle. Besly-Bowen Grinders bring to this situation a striking shrinkage in costs by using two rotary work tables: Over one the machine grinds *automatically* under control by the automatic cycling mechanism, while the operator works at the other unloading, cleaning, reloading. Result: continuous operation . . . no idle machine time . . . reasonable period for cleaning the fixture before re-loading thus reducing rework and scrap . . . non-intermittent working conditions and thus less pressure on the man.

This is only part of the success story on Besly-Bowen Grinders which also offer improved performance at these points: Positioning the work to the wheel is more accurate — Ample coolant directed to do the most good — Correct feed rate for most efficient stock removal. Whatever your grinding demands you should talk to the Besly representative in your territory, since the Besly Line covers all situations. But ask him specifically about the Besly-Bowen Radial Head Face Grinders. Meanwhile send the coupon below for advance literature to consider.

**BESLY-BOWEN**
**GRINDERS**
are Multi-Purpose Face Grinders and include models 3 horse power to 30 horse power, all available with Automatic Cycle Control.

**BESLY-WELLES** CORPORATION • Beloit, Wisconsin
Established as Charles H. Besly & Company in 1875

BESLY — BESLY Grinders, all types and sizes — Taps, Drills and Reamers by BESLY — BESLY
BESLY-TITAN Abrasive Wheels & Discs

*Send This Coupon*

Besly-Welles Corporation
118 DEARBORN
BELOIT, WISCONSIN

Please send us Besly Disc Grinder Booklet with detailed story of Besly-Bowen machines. Also (check here) have a representative call.

NAME _____
COMPANY _____ POSITION _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

# Tool up Quick ... Cut Faster


with

# CARMET CARBIDE METAL

## STANDARD TOOLS AND BLANKS


**SEND NOW**

**for CARMET CATALOG C-2**

. . . also for price list . . . great helps when you need tools fast.

This 28 page booklet shows the complete Allegheny Ludlum line of CARMET standard cutting tool blanks and cutting tools, with specifications. *Write today!*

**ADDRESS DEPT. TE-37**

Need cutting tools in a hurry? Just name the standard styles and carbide grades desired . . . get prompt shipment from a big stock *near* you.

Our line of carbide "standards" is complete. It covers 90% of all single-point operations. CARMET standard tools come ready to use . . . easy to modify for special purposes, by grinding. Style C, illustrated, is designed particularly for conversion into various shapes for numerous applications.

Other standard CARMET styles also are immediately available from local stocks.

Order CARMET tools and blanks for better, faster, cheaper cutting. There is a grade to take care of every need.

• *Allegheny Ludlum Steel Corporation, Carmet Division, Wanda and Jarvis Avenues, Detroit 20, Michigan.*

For complete **MODERN** Tooling, call

# Allegheny Ludlum

AL
FINE TOOL STEELS
SINCE 1854

W&D 3488



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-203

# Hydroforming

## improves the quality of deep drawn parts

**CINCINNATI 26" HYDROFORM**

Also built in 12", 19", 23" and 32" standard sizes. Machine size indicates maximum blank diameter that can be formed. Material thickness can range from foils to 3/8" steel.


**Write for your copy of Hydroform Bulletin M-1759**

Hydroform

**THE CINCINNATI MILLING MACHINE CO.**

CINCINNATI 9, OHIO

# Here's deep drawing with a kid glove touch!

**Pre-polished blanks of 20-gage Type 302 Stainless Steel, having a protective plastic coating over the entire blank surface, were Hydroformed in one operation to produce the Corner Ball shown above. The fact that Hydroforming does not impair the finish of the material is dramatically illustrated here, as these parts are drawn with the plastic coating *still intact!***

CINCINNATI

Deep drawing by the Hydroforming process utilizes a punch working upward into a universal die member—an oil cavity sealed by a flexible diaphragm. Sheet materials are formed to the shape of the punch by controlled hydraulic pressure.

## SURFACE FINISH IS UNIMPAIRED

The cushioned action of the flexible die member cannot mar the surface of the material being formed. Parts can be formed *after* the material is painted, plated, lithographed or highly polished.

Conventional drawing methods leave a succession of draw marks on parts produced by two or more draws. The number of draws required to Hydroform a part does not affect the surface finish quality.

## MECHANICAL VALUES ARE IMPROVED

Due to the unique drawing action, Hydroforming retains higher mechanical and physical values in the part. Because the material is uniformly worked during the draw, localized thin-out is either greatly reduced or eliminated. Hydroforming reduces springback, improving the dimensional accuracy of the part.

In addition to substantial savings on secondary finishing operations, Hydroform users report improved part quality—greatly reduced tool costs—savings in materials—reduction in the number of required operations on many parts—less time required between release of drawings and the production of part samples—many other benefits. Can *your* manufacturing program use similar economies? Then investigate Hydroforming *now*—it will change your thinking on deep drawing and forming! Contact your nearest Cincinnati Milling Machine Co. representative for full information.

Sterling silver bowl and salt shaker base Hydroformed without scratching or scuffing the extremely soft surfaces. Very little secondary work is required to produce the lustrous finish.

Cuff Link face of gold-plated brass, Hydroformed after plating.

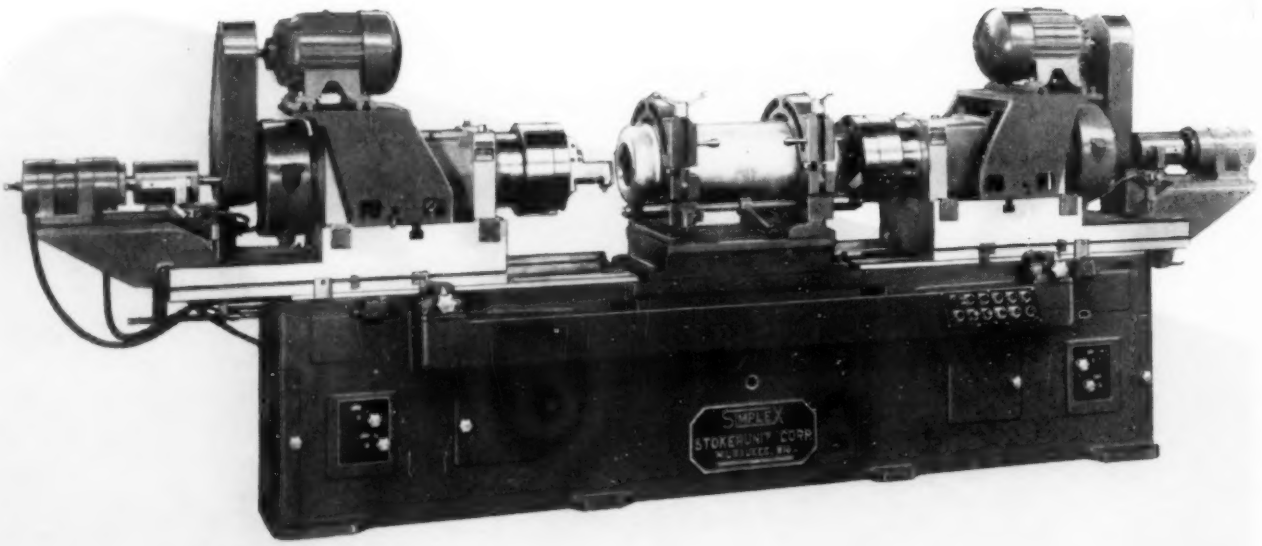
Note draw marks on part at right, produced by conventional method in 7 operations. Same part at left, produced in 3 operations by Hydroforming, has unmarred surface finish.


Section of conically shaped Hydroformed part gaged to show reduction of material thickness by forming. Note loss of only 0.005" and 0.0035" in the areas indicated. Identical section of this part produced by conventional method shows from 6% to 25% greater material reduction in same areas.

# Compare!


## Simplex PRECISION BORING MACHINES

### FOR ACCURACY AND DEPENDABILITY IN SOLVING YOUR BORING PROBLEMS




**The over-all manufacturing cost on a jet engine part was greatly reduced after the SIMPLEX #3U 2-way Precision Boring Machine shown above was included in the customer's production line. The heavy-duty #5 SIMPLEX precision boring heads supported cross facing heads upon which boring, facing, and contouring tools were mounted. Roughing and finish boring operations on both ends of the part were performed simultaneously with minimum handling and maximum accuracy.**

Simplex **PRECISION BORING MACHINES**

**SIMPLEX MACHINE TOOL DIVISION**
STOKERUNIT CORPORATION
4528 WEST MITCHELL STREET
**MILWAUKEE 46, WISCONSIN**

PRECISION BORING MACHINES • PLANER TYPE MILLING MACHINES • SPECIAL MACHINE TOOLS

# O-M CYLINDERS

**air • water • hydraulic**

## pack MORE POWER in less space!

### 14 DAY DELIVERY

Delivery time on most sizes of O-M CYLINDERS, has now been reduced to *two weeks or less!* This great savings in time is the result of our constantly increasing production facilities . . . and our complete standardization of interchangeable parts and mountings, which eliminate the need for castings and special patterns.


Available in a full range of sizes (1½" to 8" bores), powerful, dependable O-M CYLINDERS require ⅓ *less installation space* than conventional cylinders with the same bore. The elimination of tie rods and bulky end caps by O-M's *Internal Locking process* saves valuable machine space, provides better balance, which reduces distortion and facilitates friction-free performance. Easy to install. Easy to repack. O-M CYLINDERS are all machined steel with bearing bronze. (No Castings.) End plugs are tapped for universal mounting. Ports can be oriented to any angle. Complete range of mounting brackets, interchangeable bore for bore.

Coupon below brings complete details on the many advantages of O-M CYLINDERS.


NO TIE RODS OR SPACE-EATING END CAPS ON *O-M* CYLINDERS

***Send Today for FREE Catalog and Complete Set of Templates***

***Latest catalog*** contains complete, detailed information and specifications on all O-M CYLINDERS and parts. (Standard, oversize and 2-1 piston rods.)

***Complete Set of O-M Templates,*** (one-half scale), shows all cylinders and mounting brackets. These templates provide valuable assistance in the design and application of O-M CYLINDERS to your particular requirements.


**ORTMAN MILLER MACHINE CO.**

1216 150TH STREET, HAMMOND, INDIANA

☐ Please send latest O-M Catalog
☐ Please send Complete Set of Templates

Name ..... Position .....

Company .....

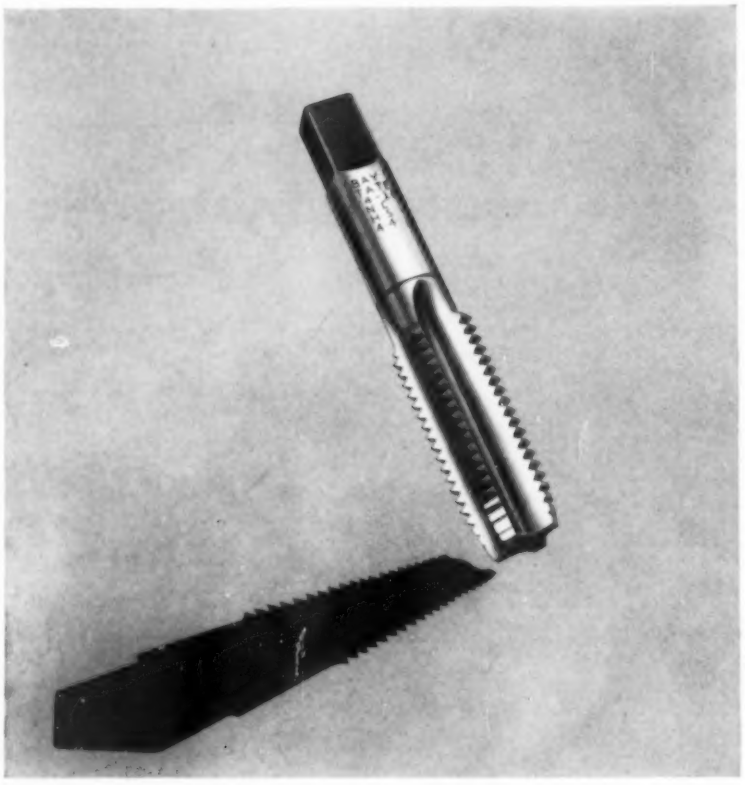
Address .....

City ..... Zone ..... State .....

**MAIL COUPON NOW**



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-207



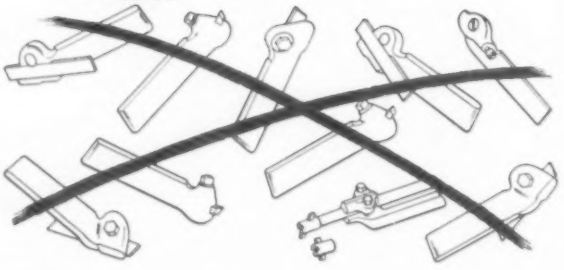
After more than a half century of research, Bay State has developed a tap of material, design, and heat treatment that will produce threads of the utmost precision with a maximum of productivity. We refer to this dual quality of Bay State Taps as Precision Performance. It is readily obtainable from nearby shelves of Industrial Supply Distributors.

Regular and Special Taps and Dies for Every Application.

**BAY STATE TAPS**

BAY STATE TAP & DIE COMPANY, MANSFIELD, MASS.
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-208-1

# ONE ALL PURPOSE TOOL HOLDER INSTEAD OF TEN



ONE tool holder for all positions . . . No tool chatter . . . can do internal boring or internal threading . . . Ideal for carbide tools . . . Bit sizes: ¼", 5/16", ⅜", 7/16", ½", ⅝".

**ACME TOOL COMPANY**
75 WEST BROADWAY NEW YORK 7, N. Y.

USE READER SERVICE CARD; INDICATE A-1-208-2

**NEW BALANCED TOOL BITS do most cutting for you**


# du MOST®

**SUPER HIGH SPEED GROUND BITS**

have balanced toughness, wear resistance, heat resistance — give you *the most cuts per bit and per dollar.*

**GET THE FACTS** on du MOST Bits — *Clip The Coupon*

**The du MONT CORPORATION**
**Greenfield, Massachusetts**

Please mail Comparison Chart C-1 and complete information on Sizes and Prices of du MOST Tool Bits.

*Name* .....
*Company* .....
*Address* .....

USE READER SERVICE CARD; INDICATE A-1-208-3

# STOP
# THE BIGGEST THIEF
# IN AMERICA

OAKITE GIVES YOU
THREE WAYS
TO FIGHT RUST

Day and night—wherever your steel is stored or handled—RUST, the biggest thief in America, is robbing you of production, robbing you of profit.

Oakite can help you defeat rust three ways:

1. **By removing rust from raw steel**—often eliminating a pickling operation by removing oil and rust at the same time.
2. **By preventing rust during processing**—protecting your steel during stamping, milling, machining or grinding—through finishing and assembling—all the way to shipping.
3. **By preventing under-coat rusting of painted products**—combining cleaning, paint-conditioning and rust prevention into one operation.


## One department saves $1,000 a month

An enterprising foreman for a large Eastern manufacturer of precision steel parts kept a six-month record of the results of a special anti-rust campaign in his department.

After determining the saving of time formerly spent on re-processing rusted parts, he told the Oakite Technical Service Representative who had helped in the campaign: *"This saving has been over $1,000 a month."*

Today the company is intensifying the anti-rust campaign under the competent direction of that foreman—and is extending the campaign to other departments.

One of their chief weapons in stopping rust—during grinding, polishing, tumbling, assembly and other operations—is Oakite Special Protective Oil.

A 16-page illustrated booklet on *"How to prevent rust with Oakite Special Protective Oil"* is included in the FREE Oakite Anti-Rust Kit offered in the coupon.

**FREE** For the Oakite Anti-Rust Kit that tells about these three ways to stop RUST in your plant, just drop us a note or mail the coupon.

SPECIALIZED INDUSTRIAL CLEANING
**OAKITE**
MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC.
58 Rector St., New York 6, N. Y.

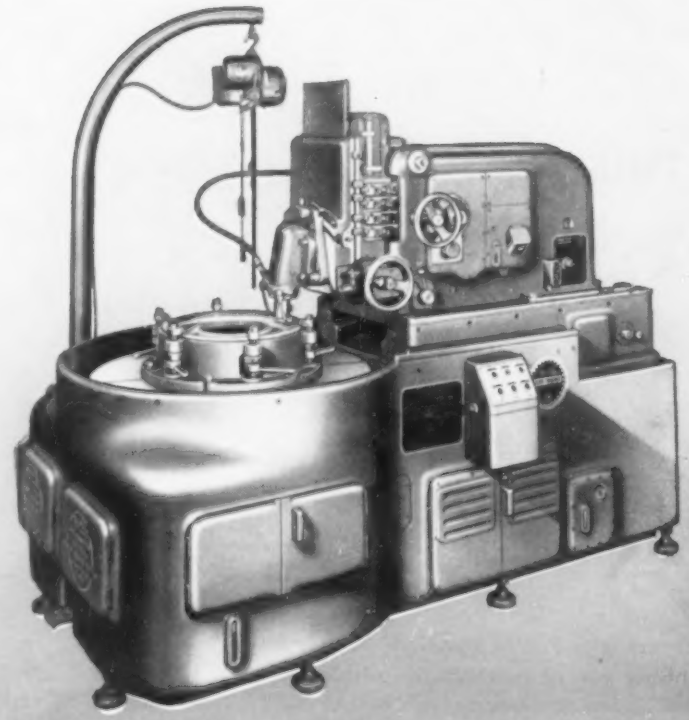
Please send me the FREE Oakite Anti-Rust Kit.
I am particularly interested in:

- ☐ Removing rust from raw stock.
- ☐ Preventing rust during processing.
- ☐ Preventing under-coat rusting of painted products.

*Name*_____

*Company*_____

*Address*_____



RED RING

INTERNAL-EXTERNAL
GEAR SHAVING
MACHINES

*For the Precision Finishing of Gears Up To 120" PD*

*Other models available for gears up to 220" PD*

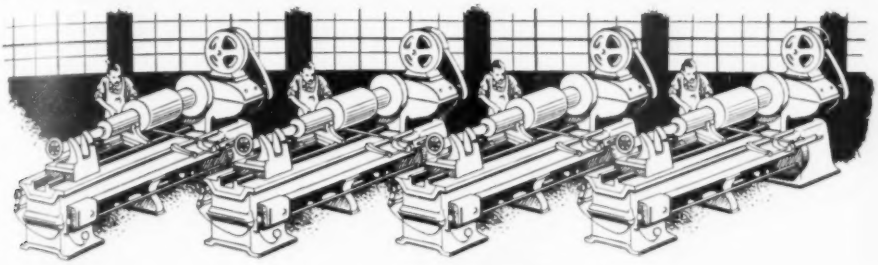
SPUR AND HELICAL
GEAR SPECIALISTS
•
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORM

NATIONAL BROACH & MACHINE CO.
5600 ST. JEAN • DETROIT 13, MICHIGAN

# Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributors: Bethlehem Steel Export Corporation

## Output up 150 pct with Red Sabre Bits

Four identical lathes, side by side, produced identical parts in one of our customer's shops. Using both high-speed steel and carbide tool bits, the rate per shift was set at 150 pieces per machine by the time-study engineers.

One of the lathe operators heard about our Red Sabre tool bits from a friend. So he brought one to work and began using it. He surprised himself by finishing 325 pieces in one shift, earning a nice bonus.

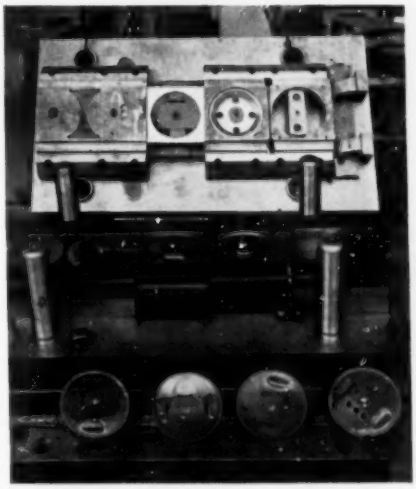
When he kept up his high rate, the payroll department began to ask questions. But a check-up showed that the operator's production was being reported correctly. In fact, his output increased to an average of 370 pieces.

When the time-study men got to the bottom of the mystery they really became enthusiastic. Red Sabre bits were installed on all four lathes. Output reached as high as 400 by increasing speeds and feeds.

Red Sabre bits are mighty popular in this shop because both the machine operators and the management are reaping the benefits of the increased output.

Red Sabre is our super high-speed steel. It has more wear-resistance and higher red-hardness than run-of-the-mill tool bits. Red Sabre tool bits, hardened to a minimum of Rockwell C-65 and ground accurately, are available in all standard sizes.

Like to try them in your shop? Order a couple from us at Bethlehem, Pa., or ask your distributor about a trial.



**HIGH-PRODUCTION DIE**

This blanking, drawing, and forming die is made of high-carbon, high-chromium tool steel (our Lehigh H) to make possible long production runs. Operated in a 350-ton press, it produces end caps for a refrigeration unit. Hardened to Rockwell C-60, this die turns out about 100,000 pieces from 3/16-in. steel strip before redressing is needed. An air-hardening grade of tool steel, Lehigh H provides very high wear-resistance and the least amount of distortion during heat-treatment.

(Left) A kitchen-ware maker uses BTR* for the die that blanks and draws .032-in. aluminum to accurate size. The fit between the die halves is held to close tolerance to assure proper flow of metal during the one-stroke draw and to produce a smooth surface. This die has produced more than half a million pieces.

(Right) In a single operation these piercing dies, made of our BTR* tool steel, put 125 holes in the aluminum accessory for pressure cookers shown at the right. The punches were in excellent alignment after heat-treatment, and showed little evidence of wear after producing 165,000 pieces without requiring regrinding.

*BTR is an economical, general-purpose tool steel. Oil-hardening, it's easy to machine and heat-treat. Tough and wear-resisting, it's low in distortion.

## BETHLEHEM TOOL STEEL ENGINEER SAYS:

### Remedy those fatigue-failures

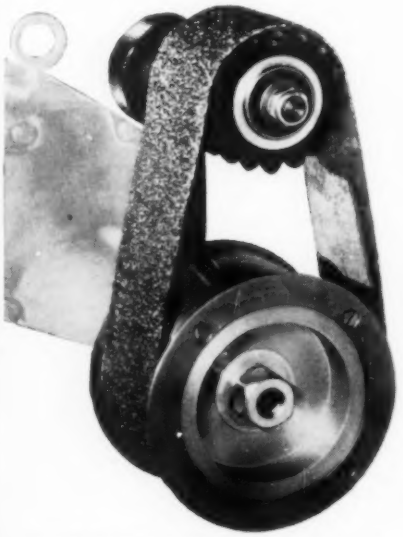
Tools such as chisels, that are subjected to repeated stresses, often fail suddenly. As the tools are made from shock-resisting steel, these sudden failures can look mysterious. But close examination of the failed parts will often reveal that the failures were actually not sudden but occurred by progression of a crack part way through the section, followed by sudden fracture of the remaining section.

Fatigue-fractures have a characteristic, smooth-rubbed surface where the initial crack opened up, and an inner crystalline zone revealed by the final sudden break. Often the smooth-rubbed surface shows parallel "oyster-shell" markings, and may even show evidence of rusting.

Fatigue-failures usually begin at a stress-concentration point. This may be a notch, a poor fillet, tool mark, accidental nick, or a stamping. Correcting such design or mechanical faults is the cure.

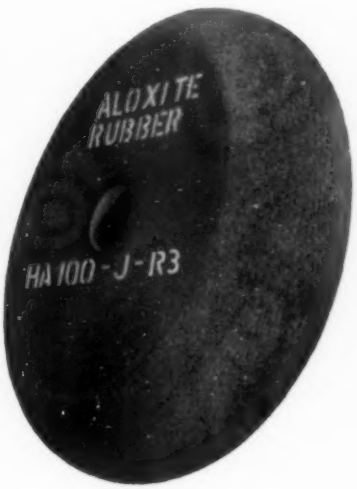
# 2 pages of HELPFUL COST CUTTING IDEAS for YOU

**"GREEN-GRIT"** silicon carbide wheels in vitrified bond put keen edges and fine finishes on carbide tipped tools—to close tolerances. Recommended gradings for offhand and surface grinding, wet or dry: rough, GC60-H11-VR; finish, GC100-G5-VR.



**NEW "PORT-A-BELT"** Grinding Attachment quickly converts any horizontal portable grinder to a belt grinder. It's light—compact—easy to attach. It's a natural for any metal-working shop concerned with die and mold grinding, weld cleanups, edge breaking, contour finishing. Often eliminates 2 or 3 operations.


**NEW RESILIENT FEED WHEELS** prove ideal in centerless grinding of armatures and other work requiring light but even pressures. Wheels are standard A 80-R2-R grading, with specially designed resilient rubber center. They'll save money for every centerless user.

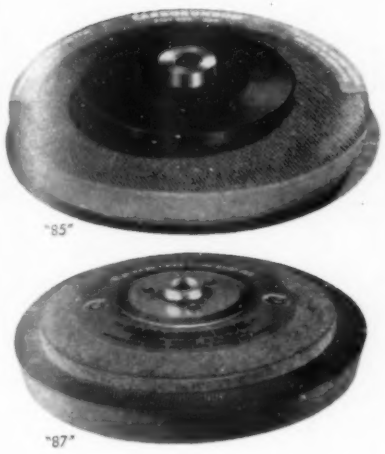



**NEW R3 (Rubber) BOND RACEWAY WHEEL** lowers costs in the bearings industry. It cuts cool, holds form—reduces regrinds and rejects. One wheel often replaces tandem mountings. You'll get far more output per wheel, too.

# ...from CARBO

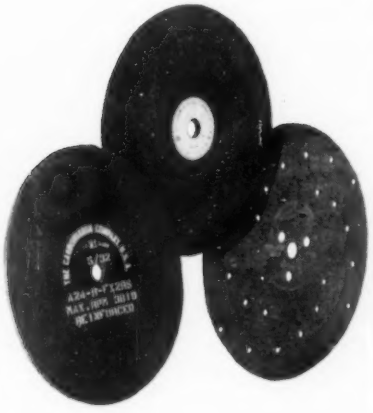
TRADE

*"Carborundum", "Aloxite", "Green-Grit", "Red-I-Cut", "Fastcut", "Port-A-Belt", and "MX" are trademarks of The Carborundum Company, Niagara Falls, New York*




**"FASTCUT"** Pad 85 Assembly now permits *wet* sanding with discs, a brand new finishing method that gives better finishes in far less time. Complements the "FASTCUT" Pad 87 Assembly for dry disc sanding—another cost-cutter for you!

---



Abrasive **CUTTING OFF WHEELS**—from 12 to 20 times faster than steel saws—produce smoother cuts at lower cost than other, conventional, methods. Rubber bond for wet cut-off, resinoid bond for dry, "MX" for free hand... CARBORUNDUM makes the *right* wheel for any metallic or non-metallic cut-off job.

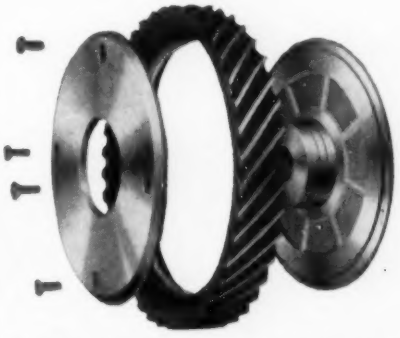
**"RED-I-CUT"** Waterproof Paper has revolutionized wet sanding operations in thousands of shops. With its new flexible backing and a new resin bond, you can confidently expect it to deliver a faster cut, a better finish, and up to 50% longer useful life on production runs.

---


**RUBBER BUSHED WHEELS,** used with rubber washers, are being widely adopted because they reduce vibration to a minimum in portable grinding. Results: less operator fatigue, greater output and longer wheel life. Every user of portable equipment should investigate these cost-cutting wheels.

**V1 BOND,** outstanding performer in internal grinding, is now saving money for users of mounted wheels and points. Why? They last longer, cut faster, hold form better, because V1 Bond is stronger, free-cutting. And for quality of finish obtained, they're unsurpassed.

---



**"T-61" UNIVERSAL HUB CONTACT WHEEL ASSEMBLY** now combines economy of longer belt life, achieved by serrated wheel surface, with equally sharp saving in wheel replacement cost. Changeable "tire" idea multiplies wheel versatility too. Hundreds of abrasive belt users are enthusiastic about results.

## You profit when you STANDARDIZE on Abrasives by CARBORUNDUM

**When you do business with the *only* supplier of all the types of abrasives there are, certain unique advantages are yours to enjoy:**

**FIRST,** a control of abrasive quality which is constant, identical, and dependable—no matter what abrasive method you use.

**SECOND,** a technical advisory service which brings to your attention every new development in the entire field of abrasives.

**THIRD,** a refreshing approach to your abrasive problems which only a complete-line source, assuming complete-line responsibility, can offer. Recommendations from CARBORUNDUM are free from bias, completely objective... thus entirely dependable.

For further information on any of the ideas shown here, call your CARBORUNDUM salesman or distributor, write Dept. TE 80-31.

# RUNDUM
MARK

## ...the ONLY source for EVERY abrasive product you need

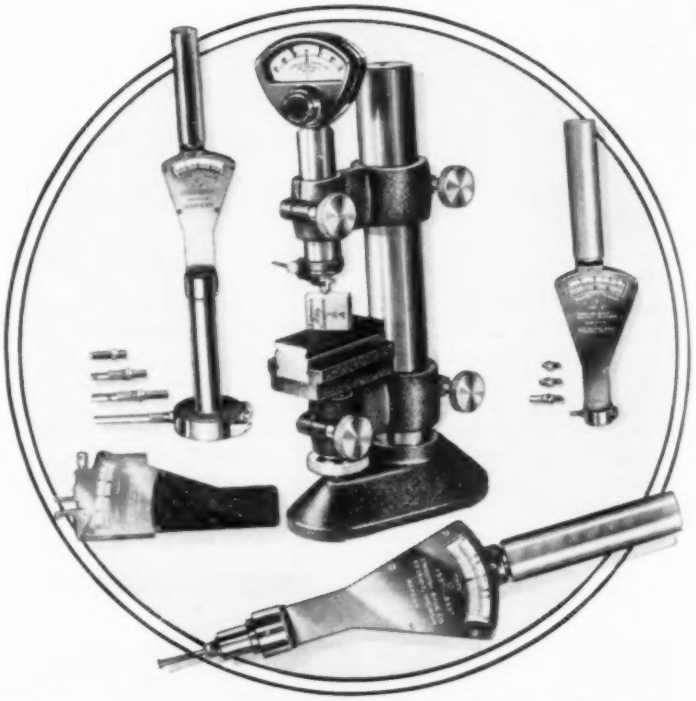
For Extreme Accuracy

You Can Depend on

# JOHANSSON GAGING EQUIPMENT

**It Assures You Precision to the Finest Degree, — to Meet Your Most Exacting Requirements — Backed by the Name Supreme in the World of Measurement.**

- **GAGE BLOCKS**
  **(JOHANSSON) and accessories.** Short deliveries. Inspection and reconditioning service available at our plant
- **INTERNAL INDICATORS**
  (or inside measurements. 155 to 24 inches) Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.
- **MIKROKATOR**
  (Amplifier — for outside measurements) Graduations .0001 to .000002 or .001 M to .0002 M
- **OTHER JOHANSSON PRODUCTS**
  Micrometers, Snap gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators

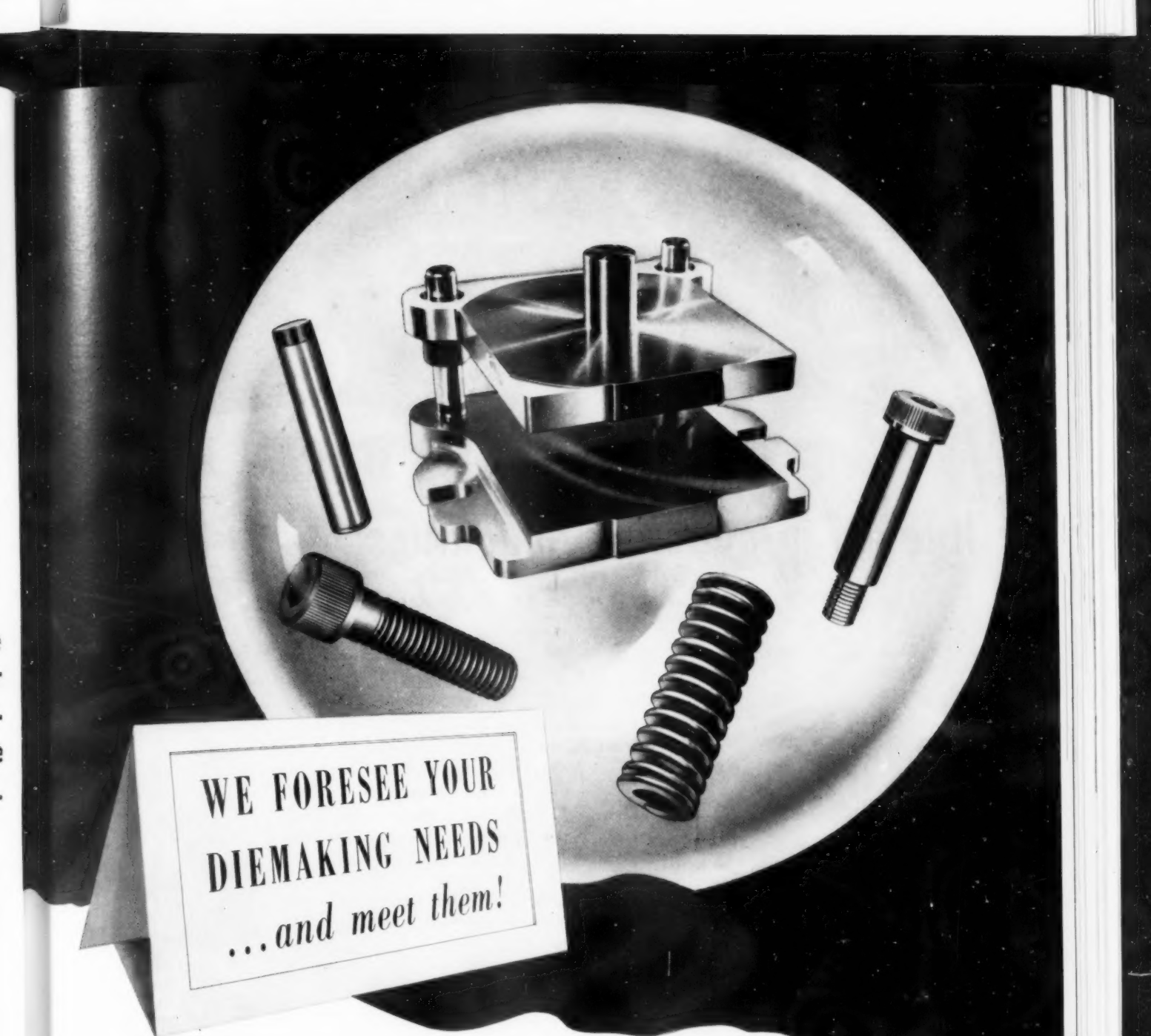


*Write for Literature*

## C. E. JOHANSSON GAGE CO.

(A DIVISION OF SWEDISH GAGE CO.)

**10641 Haggerty Ave., Box 4086 Northeastern Station, Dearborn 1, Mich.**




More than 30 years' *past* experience in supplying diemakers' needs has taught Danly how to foresee *future* needs. In almost every instance, there are *standard* Danly Die Sets and *standard* Danly Diemakers' Supplies to meet your diemaking specifications.

You can rely on Danly's reputation for precision and dependability when you start your tooling program. You can be sure of prompt delivery from completely stocked Danly branch assembly plants located in nearly every major toolmaking center.

So save tooling time . . . get into production faster . . . insure longer production runs . . . with Danly Die Sets and Danly Diemakers' Supplies.

FAST,
COMPLETE
SERVICE!

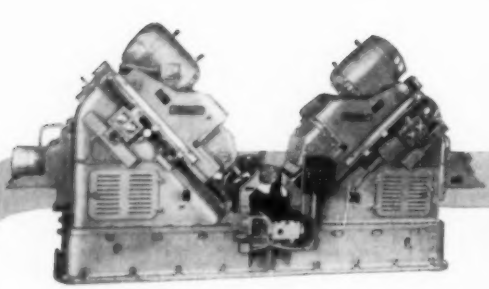
DANLY®

**DANLY MACHINE SPECIALTIES, INC.**
2100 South Laramie Avenue
Chicago 50, Illinois

***A NATIONWIDE BRANCH PLANT SYSTEM***

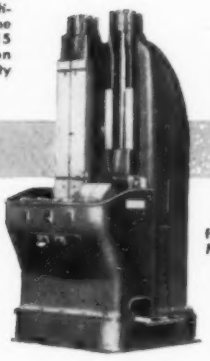
| | |
|---|---|
| ***CHICAGO** 50 | 2100 South Laramie Avenue |
| ***CLEVELAND** 14 | 1550 East 33rd Street |
| ***DAYTON** 7 | 3196 Delphos Avenue |
| ***DETROIT** 16 | 1549 Temple Avenue |
| ***GRAND RAPIDS** | 113 Michigan Street N.W. |
| **INDIANAPOLIS** 4 | 5 West 10th Street |
| ***LONG ISLAND CITY** 1 | 47-28 37th Street |
| ***LOS ANGELES** 54 | Ducommun Metals & Supply Co., 4890 South Alameda |
| **MILWAUKEE** 2 | 111 East Wisconsin Avenue |
| ***PHILADELPHIA** 40 | 511 W. Courtland Street |
| ***ROCHESTER** 6 | 33 Rutter Street |

*Indicates complete stock



Two-Way Hydraulic Feed Vee Type Stub Boring Machine

Single Slide and Broaching Machine 5, 10, 15 and 25 Ton capacity



Duplex Surface Broaching Machine 5, 10, 15 and 25 ton capacity

# FOOTBURT

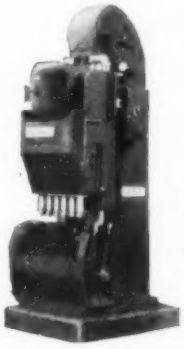
## line of production machines

*engineered for production*

1, 2, 3, 4 and 6 Spindle Sensitive Drilling Machines

● Way Type Drilling, Boring, Reaming, Tapping and Milling Machines with One, Two or More Ways . . . Station Type Machines . . . Center Column Type Machines . . . Cylinder Boring Machines . . . Inverted Drilling Machines . . . Surface Broaching Machines . . . Sensitive Drilling Machines . . . Hammond Radial Drilling Machines . . . Manufacturing Type High Duty Drilling Machines . . . Independent Feed Drilling Machines . . . Special Machines.

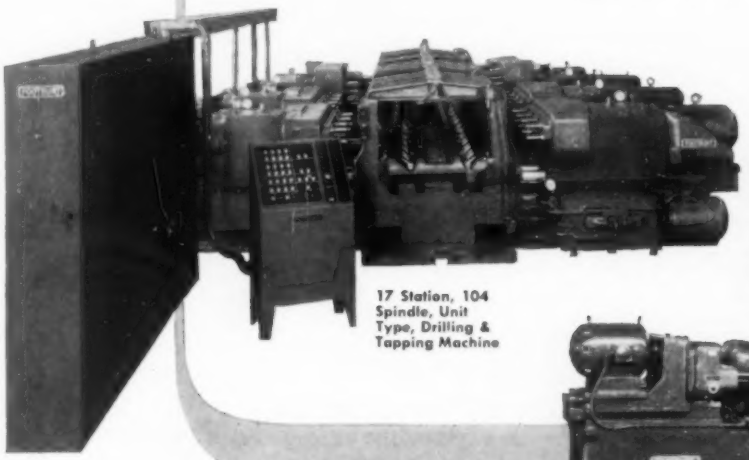
Continuous Type Broaching Machine Built in Four Sizes



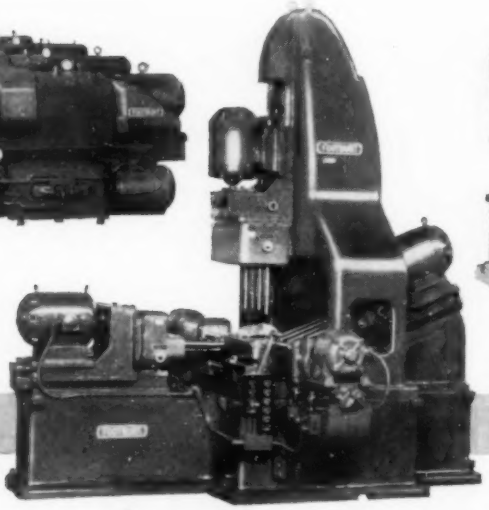
Stub Type Cylinder Boring Machines

**THE FOOTE-BURT COMPANY** • Cleveland 8, Ohio

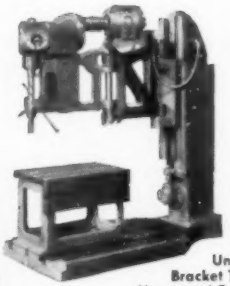
Detroit Office: General Motors Building



17 Station, 104 Spindle, Unit Type, Drilling & Tapping Machine



Five Way 21 Spindle Lead Screw Tapping Machine



Unique Bracket Type Hammond Radial Drilling and Tapping Machine

# FOOTBURT

*production machine tools*

# STANDARD CARBIDE MILLING CUTTERS

From The World's Most Complete Stock of Standard Carbide Tools

STC

Ask for catalog listing all Super Standard Carbide Tools.

QUALITY CARBIDE TOOLS

Super TOOL COMPANY

21650 Hoover Road, Detroit 13, Michigan also 5210 San Fernando Rd., Glendale 3, California

# TOOL ENGINEERING

**DEGREE IN 26 MONTHS**

BACHELOR OF TOOL ENGINEERING DEGREE IN 26 MONTHS
The Allied Institute of Technology, the oldest Tool Engineering School in America permits candidates to complete degree work in only 26 months. Time may be shortened by advanced credit given for prior training in other schools or the Armed Forces.

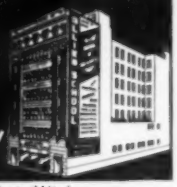
*Credit Is Given For Accepted Industrial Experience*

FULLY APPROVED: Allied courses are approved by the Dept. of Education and Registration, Superintendent of Public Instruction, State of Illinois, and Veterans Administration: All courses accredited by the CENTRAL SCHOOLS ASSOCIATION.

HOME STUDY EXTENSION COURSES offered in Industrial DRAFTING • Tool & Die DESIGN • Blueprint READING

Housing & Employment assistance given while attending school.

Approved for Veterans



Write for free information

**ALLIED INSTITUTE of TECHNOLOGY**

1138-42 S. Michigan Ave. Chicago 5, Ill.

USE READER SERVICE CARD; INDICATE A-1-218-1

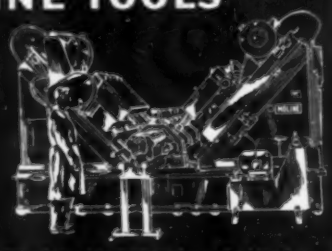
*SINCE 1901*

# MOLINE "Hole-Hog" SPECIALLY DESIGNED MACHINE TOOLS

have cut production costs for American Industry.

*DRILLING • BORING HONING • TAPPING and Special Machines*

MOLINE TOOL CO. "HOLE-HOG" MOLINE, ILLINOIS



Boring V-8 Engine Cylinders

USE READER SERVICE CARD; INDICATE A-1-218-2

# GROBET CHATTERLESS COUNTERSINKS

They are terrifically popular because the six staggered cutting edges are scientifically designed to give a shearing cut and thus eliminate all chatter.
Made in 12 sizes in all degrees; also supplied as sets in strong Kit-cases.

Send for Catalog Sheet HC1

**GROBET FILE CO. of AMERICA, INC.**
421 CANAL STREET, NEW YORK 13, N. Y.
PLANTS: NEW YORK, CHICAGO, MONTREAL

USE READER SERVICE CARD; INDICATE A-1-218-3

**• Reduce tool inventory**
**• Increase cutter life**
**• Save regrind time**

# with Madison cutters' one screw adjustment!

After many regrinds Madison cutters can be re-set to size within the expandable range of the cutter. Many times one Madison cutter can be used for several different jobs.

It's not necessary to regrind Madison cutters to exact tolerances. Just sharpen the cutting edges . . . then set to the exact size you need for the job.

In a Madison cutter there's no chance of off-center adjustment . . . both edges cut equally — lengthening cutter life.

*Write for your copy of the fact-packed Madison catalog.*

**MADISON** MANUFACTURING COMPANY
Dept. TE Muskegon, Michigan

USE READER SERVICE CARD; INDICATE A-1-218-4

Over 85% of the torque wrenches used in industry are

# STURTEVANT TORQUE WRENCHES

*Read by Sight, Sound or Feel*

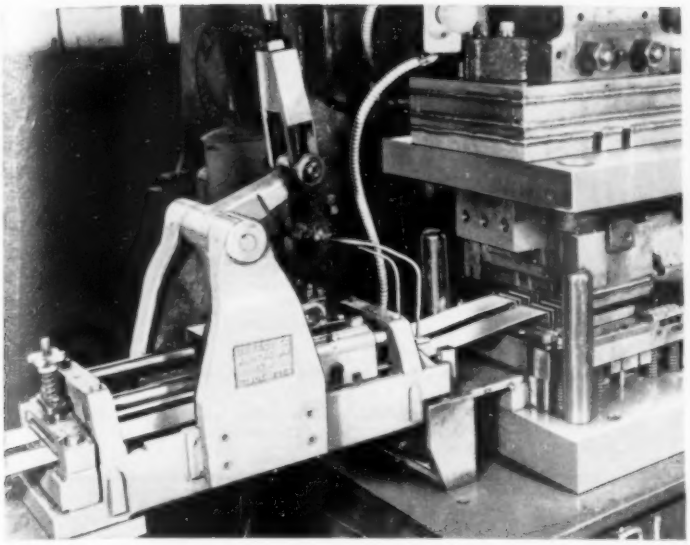
- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

*in inch ounces*
*...inch pounds*
*.. foot pounds*
*(All sizes from 0-6000 ft.-lbs.)*


*Every manufacturer, design and production man should have this valuable data. Sent upon request.*

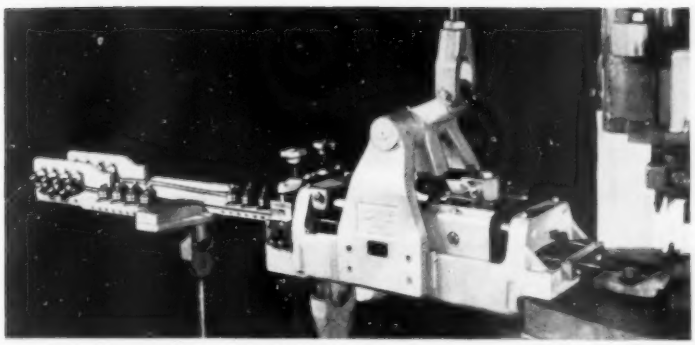
P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

USE READER SERVICE CARD; INDICATE A-1-218-5



# The Answer to Your Press Feed Problems

## U. S. Slide Feeds



**Do you want to feed thin material? Thick Material? Flat wire? Round wire? Irregular cross-sections? Two strips at a time? Whatever the job, there's a U. S. Slide Feed that can do it.**

In addition to their main feature—Controlled Accuracy—U. S. Slide Feeds are highly versatile, and can be used for feeding such materials as:

1. Flat stock (steel, brass, copper, aluminum, etc.)
2. Flat stock (paper, fibre, wire cloth, etc.)
3. Stock with tapered or irregular cross-section.
4. Round, square or hexagon-shaped wire.

Although primarily designed for feeding stock which comes in coils, the U. S. Slide Feed can be arranged for butt-feeding stock which comes in short lengths, when the thickness is over .030" and the material is of sufficient stiffness.

U. S. Slide Feeds can be used to feed more than one strip at the same time. In both of the setups shown the stock is being fed two strips at a time, thus greatly increasing production output.

U. S. Slide Feeds can pull stock through a plain straightener and maintain controlled accuracy.

**For descriptions of U. S. Slide Feeds, U. S. Roll Feeds, U. S. Straighteners, U. S. Stock Reels and U. S. Coil Cradles ask for a copy of Bulletin No. 80-E.**

US PRODUCTS

# U. S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides—U. S. Multi-Millers

U. S. Automatic Press Room Equipment—U. S. Die Sets and Accessories

## Drill Hardened Steels without Annealing –


With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon–high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

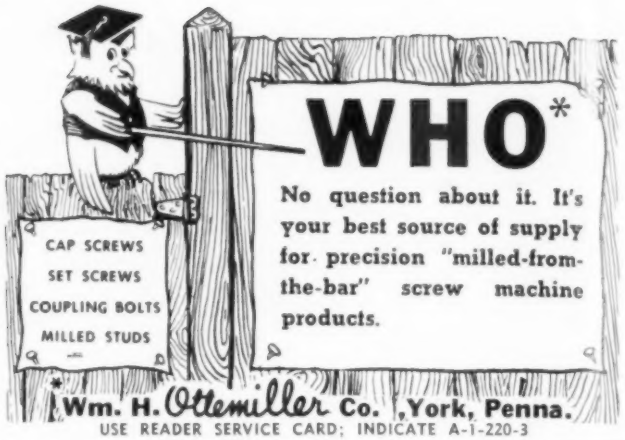
Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

**You Harden It—We'll Drill It—**
**With "HARDSTEEL"**

**BLACK DRILL COMPANY, INC.**
**1414 East 222nd St. • Cleveland 17, Ohio**

*Also makers of—*
**BLACK DRILLING UNITS—AUTOMATIC, SELF-CONTAINED—FOR COST-CUTTING PRODUCTION ON ALL MATERIALS**
*Write for information*

USE READER SERVICE CARD; INDICATE A-1-220-1




USE READER SERVICE CARD; INDICATE A-1-220-3

TO OBTAIN FURTHER INFORMATION ABOUT ADVERTISERS, TRADE LITERATURE OR TOOLS OF TODAY APPEARING IN THIS ISSUE OF THE TOOL ENGINEER, USE THE HANDY READERS SERVICE CARD ON PAGE 131.

## WILDER PROJECTOR


**Optical Projection Detects Errors**
**Horizontal Stage: No Clamps Needed**
**Comfortable Inclined Screen**
**Micrometer Cross Slide Adjustments**
**WRITE FOR ILLUSTRATED FOLDER**

**GEORGE SCHERR CO., Inc.**
COMPLETE LINE OF PRECISION INSTRUMENTS
**200C LAFAYETTE ST. • N. Y. 12, N. Y.**

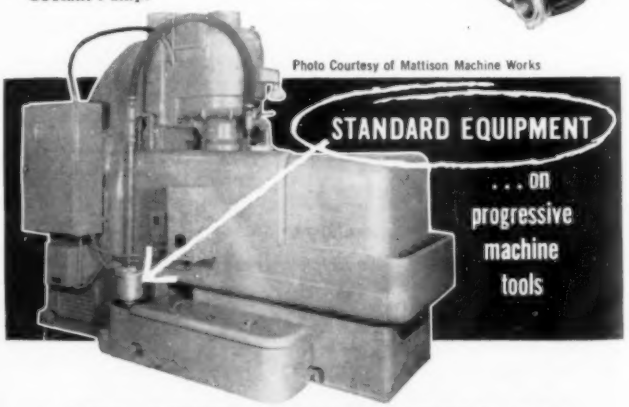
USE READER SERVICE CARD; INDICATE A-1-220-2

## RUTHMAN GUSHER Coolant Pumps

Your *Gusher* Coolant Pump is scientifically designed and precision built by experts to give you an efficient, trouble-free, and long lived coolant pump.

The leading machine tool manufacturers know this from experience. That's why they use Gusher Coolant Pumps as standard equipment on their machines.

The Mattison Machine Works #24 Rotary Surface Grinder illustrated is equipped with a ½ HP Gusher Coolant Pump.



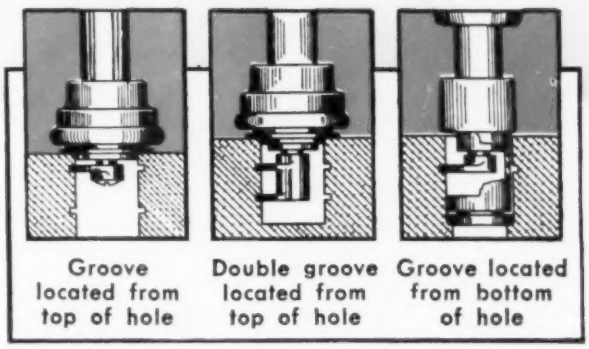

**THE RUTHMAN MACHINERY CO.**
1810 READING RD., CINCINNATI, OHIO

USE READER SERVICE CARD; INDICATE A-1-220-4

# Waldes Truarc Internal Grooving Tool

## for precision cutting of internal grooves in bores and housings

## FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!



Groove located from top of hole | Double groove located from top of hole | Groove located from bottom of hole

Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressure—especially suitable for unskilled operators.

The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

*Write now for new 12-page Catalog giving mechanical details, cutting sizes...extra features...full information*

**WALDES**

**TRUARC**

REG. U.S PAT. OFF.

**GROOVING TOOL**


WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y.
Waldes Truarc Grooving Tool
Manufactured under U. S. Pat. 2,411,426

Waldes Kohinoor, Inc., 47-16 Austel Place
Long Island City 1, New York TE015

Please send me your new 12-page Catalog on Waldes Truarc Internal Grooving Tool.

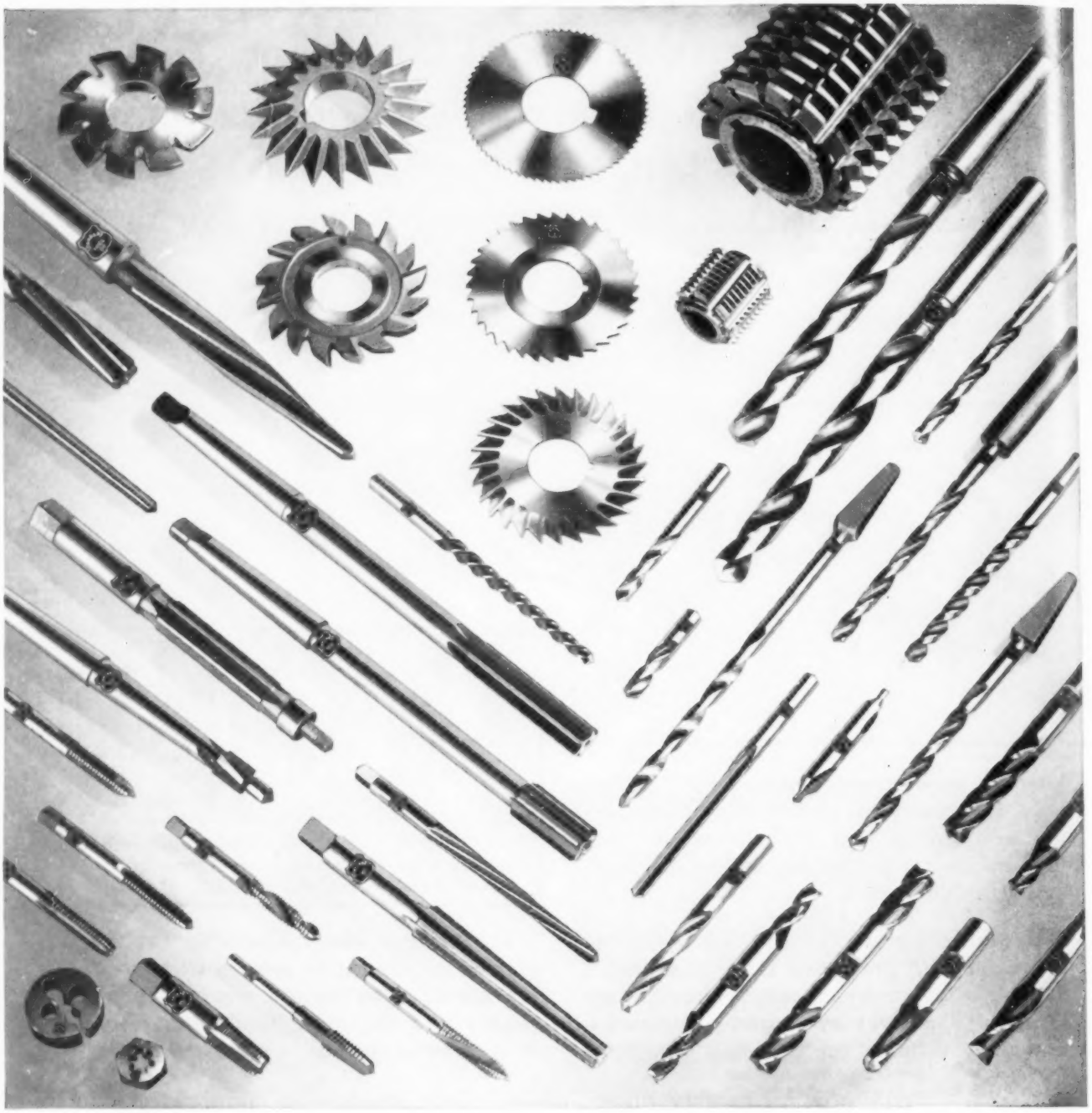
Name_____

Title_____

Company_____

Business Address_____

City_____ Zone____ State_____



## Solution for tough jobs—Since 1881

SEND us your tough drilling, reaming, tapping and milling jobs—we have helped men in industry solve them for 71 years. If the problem is a new metal, faster production or greater accuracy, have a Standard Service Man look at it. He is qualified by our 71 years of experience.

We have grown with industry by keeping ahead of these developments. Industrial Distributors coast to coast give prompt delivery on our complete line of Shield Brand Tools. Why not Standardize and start saving now?


*New Hob Tolerance Chart —write for a copy.*

# STANDARD TOOL CO.

3950 CHESTER AVENUE
CLEVELAND 14, OHIO

**New York • Detroit • Chicago • Dallas • San Francisco**

THE STANDARD LINE: ***Twist Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • Hobs • Counterbores • Special Tools***

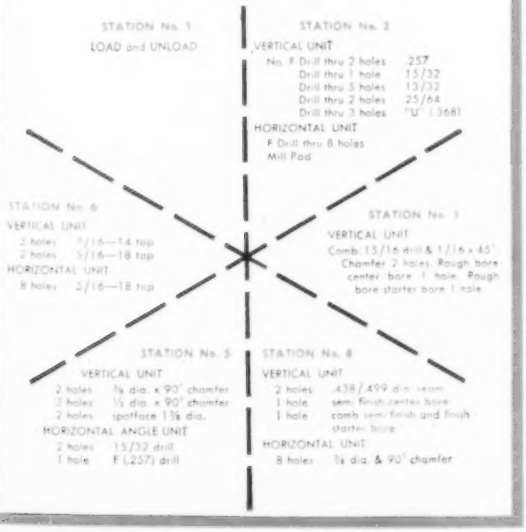
ANOTHER
COMPLEX
DRILLING PROBLEM

# SOLVED

by

with a BAKER SPECIAL MACHINE


Baker Multi-Operation Machine utilizing standard Baker 7½ x 16 and 15 x 16 units and a 72" six-station power indexing table, performs drilling, chamfering, boring, counterboring, and tapping operations on clutch housings at the rate of 80 parts-per-hour at 100% efficiency.




Baker Special Drilling Machines, composed of standard Baker units arranged to suit each individual problem, are designed for *productivity*. Units arranged in vertical, horizontal and angular planes perform multiple operations *faster . . .better . . . automatically* . . . with greater accuracy and efficiency. Consult Baker engineers for a better solution to your drilling problems.

..SINCE 1867

**BAKER BROTHERS, INC. Toledo, Ohio**

DRILLING...TAPPING...KEYSEATING and CONTOUR GRINDING MACHINES

# NOW CRUCIBLE TOOL STEEL available in HOLLOW FORM

Available in these famous Crucible brands:
Ketos® Airdi 150
Sanderson Carbon Tool Steels

## *here's what it means to you:*

Why pay for the steel in the hole you drill out! Manufacturers of tool steel parts with cut-out centers can now get Crucible Tool Steel as hollow rings and bars! If you use tool steel in sleeves, ring gauges, rolls, stamp dies, cams, slitters . . . or in any of a hundred other ring-shaped parts—find out about Crucible Tool Steels in *hollow form*.

Familiar steels like Sanderson, Ketos, and Airdi 150 now come to you with machine-finished inside and outside diameters in a wide range of sizes. Selecting the size and grade you need reduces your finishing costs to the vanishing point. And it's immediately available!

Crucible's strategically-located warehouses now have complete stocks of Crucible Hollow Tool Steel. To take advantage of the new product, simply let your nearest warehouse know the dimensions you need. They will cut you a ring of Crucible Hollow Tool Steel to meet your O.D. and I.D. and length requirements.

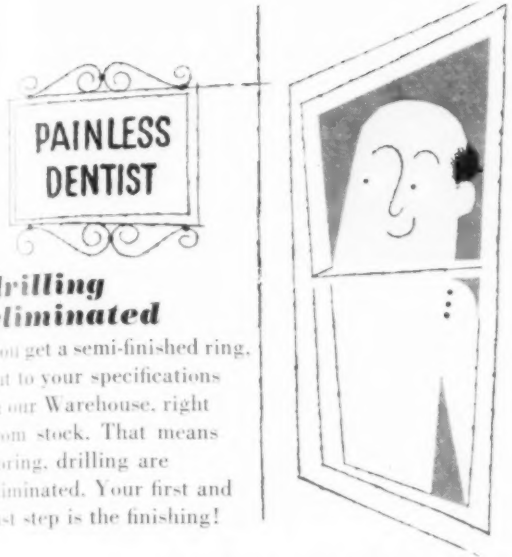
For full information and literature on new Crucible Hollow Tool Steel, call your nearest Crucible warehouse today . . . or write for new brochure describing this new product! Address Dept. TE. Crucible Steel Company of America, Chrysler Building, N. Y., N. Y.

CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

HOLLOW® TOOL STEEL

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.




***drilling eliminated***

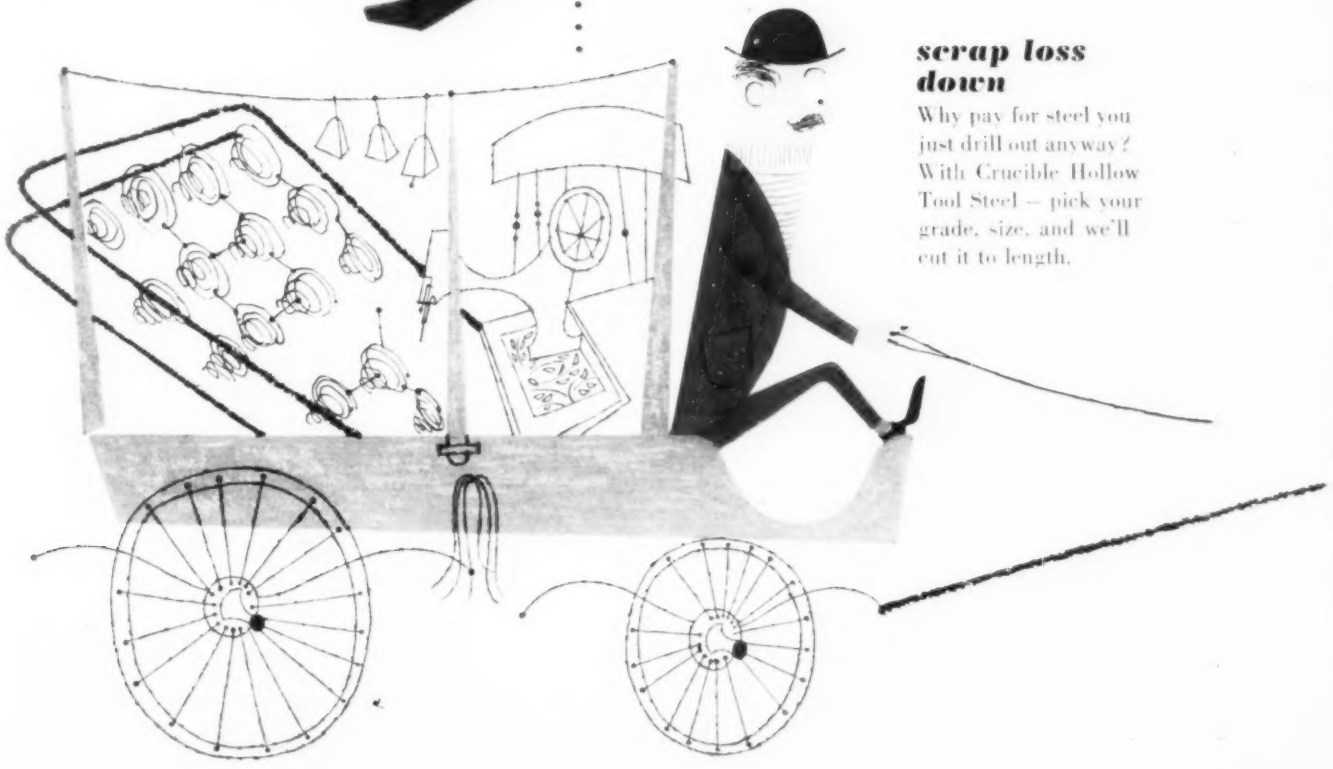
You get a semi-finished ring, cut to your specifications in our Warehouse, right from stock. That means boring, drilling are eliminated. Your first and last step is the finishing!

***immediately available***

Crucible Warehouses in your area are fully stocked and ready to serve you with this new Crucible product.

***machine time cut***

Manufacturing costs go down when you use Crucible Hollow Tool Steel. Expensive machining is eliminated. Production time per unit is lowered. Machine capacity is increased.



***scrap loss down***

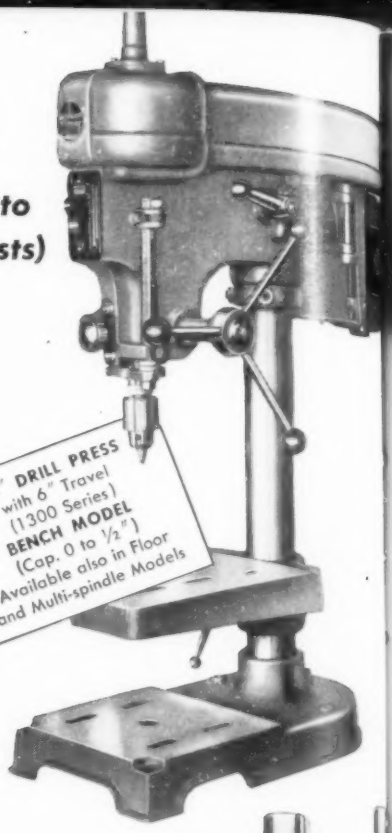
Why pay for steel you just drill out anyway? With Crucible Hollow Tool Steel — pick your grade, size, and we'll cut it to length.

# Designed for **every** drilling need

*(particularly the need to cut production costs)*

**new WALKER-TURNER**

## LIGHT-HEAVYWEIGHT DRILL PRESSES





**15" DRILL PRESS**
with 6" Travel
(1300 Series)
**BENCH MODEL**
(Cap. 0 to ½")
Available also in Floor and Multi-spindle Models

**15" DRILL PRESS**
with 4" Travel
(1200 Series)
**FLOOR MODEL**
(Cap. 0 to ½")
Available also in Bench and Multi-spindle Models

**RADIAL DRILL**
15 Spindle Speeds
(Cap. 0 to 1")
(Radial Drills with 6" spindle travel available on special order)

**SOLD ONLY THROUGH TRAINED INDUSTRIAL DISTRIBUTORS**

**20" DRILL PRESS**
Hand or Power Feed
**MULTI-SPINDLE MODEL**
(Cap. 0 to 1")
Available also in Bench and Floor Models

## For Complete Information

about Walker-Turner Drill Presses, write your name and address in the space below, indicating type of Drill (15", 20", Radial) in which you are interested.

. . . . **Use this space** . . . . .

to write for full details and specifications.
Walker-Turner Division, Kearney & Trecker Corp.
Dept. T-1, Plainfield, N. J.

*(Please write your name and address in margin of page)*

WALKER-TURNER
• DIVISION •
KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

DRILL PRESSES • RADIAL DRILLS • TILTING ARBOR SAWS • BELT and DISC SURFACERS
METAL-CUTTING BAND SAWS • LATHES • SPINDLE SHAPERS • JOINTERS

# R and L TAP AND DIE HOLDER

## *Patented instant release action readily changes to left hand threading*

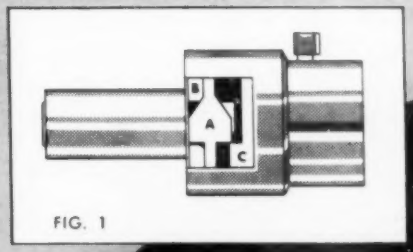



FIG. 1







FIG. 2

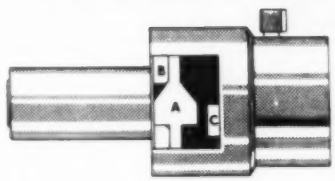



FIG. 3

Fig. 1. The clutch slightly engaged at C at start of threading operation.

Fig. 2. The clutch instantly engaged to full contact between A and C at moment tap or die engages work.

Fig. 3. Fully released, there is ample clearance between clutch's contact points.

Note: A shorter clutch ring retaining nut can be substituted for operation on extra short threads.

*Write for complete catalog*

**RIGHT R and L LEFT TOOLS**

**1825 BRISTOL STREET • PHILADELPHIA 40, PA.**

TURNING TOOL • TAP AND DIE HOLDER • UNIVERSAL TOOL POST • TURRET BACKREST HOLDER • CUT-OFF BLADE HOLDER • RECESSING TOOL
RELEASING ACORN DIE HOLDER • REVOLVING STOCK STOP • FLOATING DRILL HOLDER • KNURLING TOOL • CARBIDE AND ROLLER BACKRESTS



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-1-227

# ONE PASS *Broaches* SIX WINDOW OPENINGS

## Typical result engineered the *American* way

A special, large, American-engineered, automatic, six station pull head, on a standard American VP 3-10-30 Vertical broaching machine, helps to speed production on this automatic transmission part. A total of twelve angular sides, plus twenty-four corner radii are finish broached on 150 of these steel forged parts per hour. The machine is equipped with an American-engineered fixture with a manually operated work slide interlocked with the machine cycle for maximum safety.

Developing jobs of this type is an everyday occurence at American Broach. Your broaching job benefits from the skill and experience of American engineers . . . engineers who design all three . . . broaches, broaching machines and broaching fixtures. Remember, the best way to do your job within cost and production requirements . . . is the American Way.

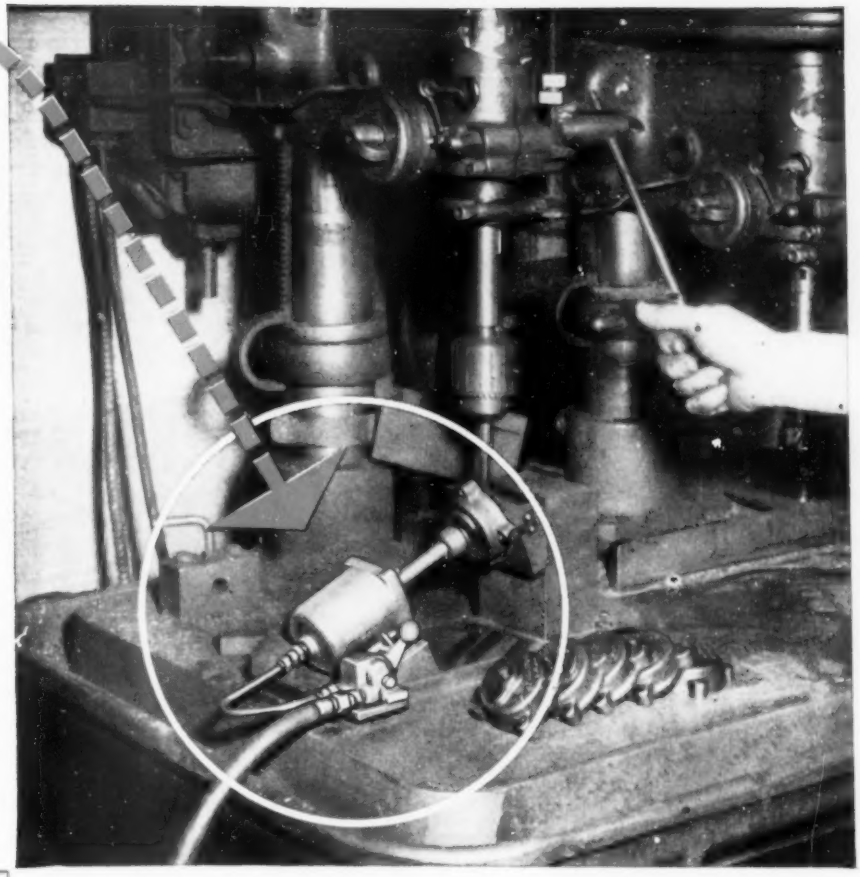
*Write for our new Blue & Gold catalog containing complete machine specifications. Address Dept. T.*

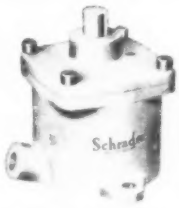
AMERICAN *American* BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

SUNDSTRAND

**See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery**

# Simplify any work-holding problem





Base Mounted

Leg Mounted

## CLAMPAIR CYLINDERS

Schrader ClampAir Cylinders are available either base or leg mounted, in 1", 2¼" and 3" diameters delivering a 2" or 1" stroke. A wide selection of Schrader Valves is available, too, to operate ClampAirs.

Watch a worker making ready for a simple drilling operation. He places the work in a fixture and hand-clamps it. With everything all set to go, you'll find he takes as much as ten seconds just to grip the work tightly in the clamp.

Multiply that by thousands of machine operations. You'll find a substantial portion of work time is used up *before* actual production begins.

*You can eliminate* nearly all of this lost time with the new Schrader ClampAir Cylinder...with no more effort than opening a valve.

The ClampAir – actually a bantam air cylinder – has plenty of power to hold work firmly – with the same force every time. *No more rejects from uneven holding forces!*

ClampAir will serve you well on drill presses ... milling machines ... gluing operations – and scores of other places all over the shop. In all of these, production can be boosted with ClampAir. And remember – since ClampAir is basically a push-type air cylinder, you can use it any time you need a short, hard stroke.

It's easy to find out how ClampAir can increase production and worker efficiency. Write, outlining the applications in which you are interested – or fill out the coupon below.

**Schrader**
REG. U. S. PAT. OFF.

products control the air

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

Mail This Coupon Today

A. SCHRADER'S SON
*Division of Scovill Manufacturing Company, Incorporated*
462 Vanderbilt Avenue, Brooklyn 38, N. Y., Dept. H-5

I am interested in more information on.....

Name _____ Title _____

Company _____

Address _____

# Beaver TOOLS ARE WORKIN' FOOLS!

The Beaver system of Quick-Change Tool Holders and Adaptors will enable you to do a better job —quicker and more economically—with every milling and boring machine in your shop.

Beaver Quick-Change Tool Holders and Adaptors give you complete interchange of tooling. Not just for one machine but for any machine equipped with a precision-made Beaver Holder.

Tool changes can be made in a jiffy! No knock-out—no realignment—NO DOWNTIME! Just a twist of the cam-ring and the next tool is locked accurately in position, saving untold hours of production time.

Beaver Quick-Change tooling has been proved "right" by every-day use in hundreds of plants for over a decade.

Treat your plant to the best! Switch to Beaver Quick-Change tooling today and join the impressive list of Beaver-tooled plants.

*For complete details ask for our catalog #52.*

**Beaver TOOL AND ENGINEERING CORPORATION**

2850 ROCHESTER ROAD • BOX 429, ROYAL OAK, MICHIGAN

# TAVANNES

CAPACITIES TO
2⅜" DIA. & 21⅝" LENGTH

## Single Spindle Automatic Lathe

View shows set-up to produce this 21⅝"-long piece.

Headstock feed permits all turning operations to be performed at point of support.

Rugged construction throughout. All tool adjustments readily accessible. Camming simple to make and apply.

**SIX** CROSS SLIDES

**SIX** END TOOLS

**Precision • Flexibility • High Production by**

# TAVANNES

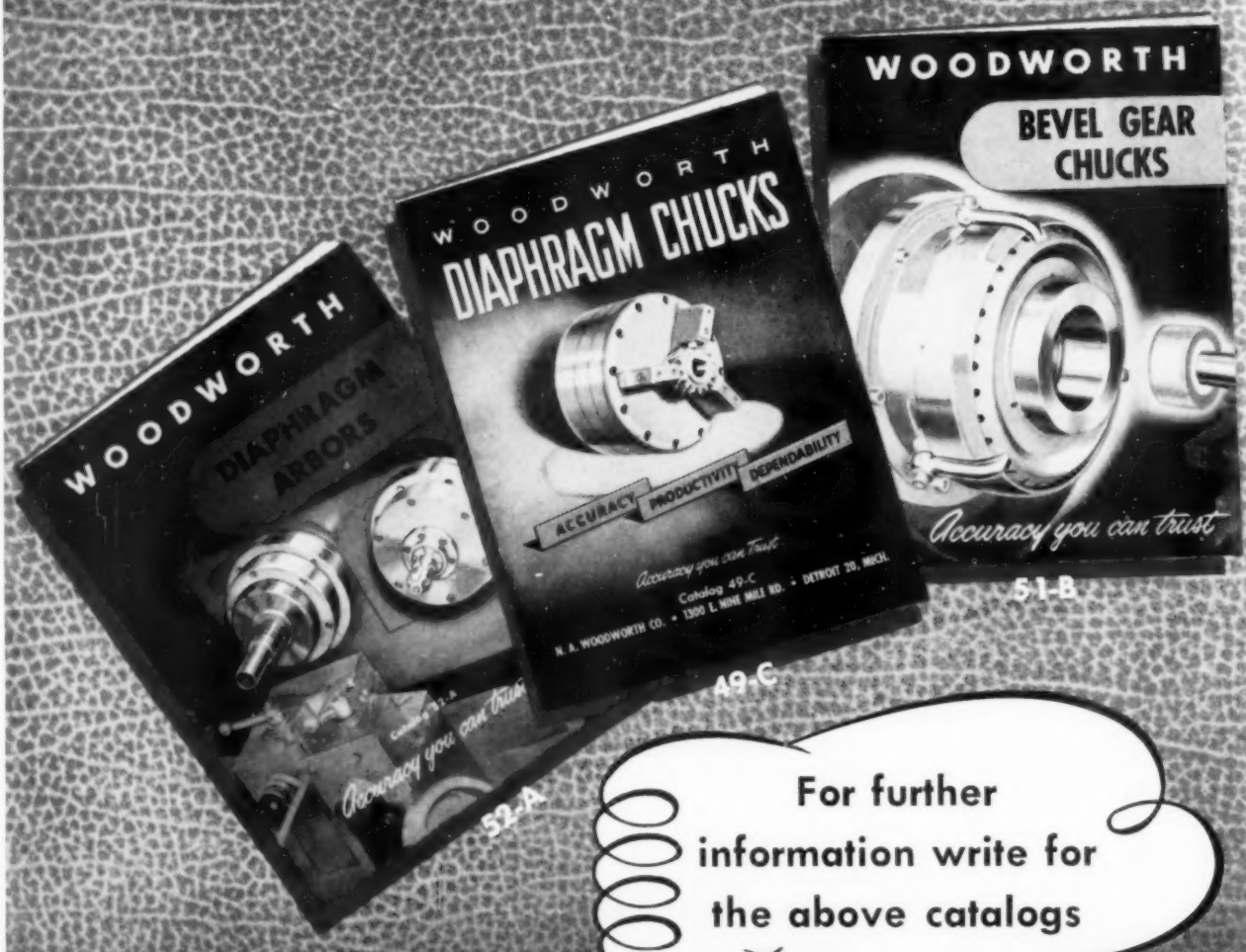
AMERICAN REPRESENTATIVES

•

**RUSSELL, HOLBROOK & HENDERSON, INC.**

292 MADISON AVENUE, NEW YORK 17, N. Y.

# Precision Chucking by WOODWORTH



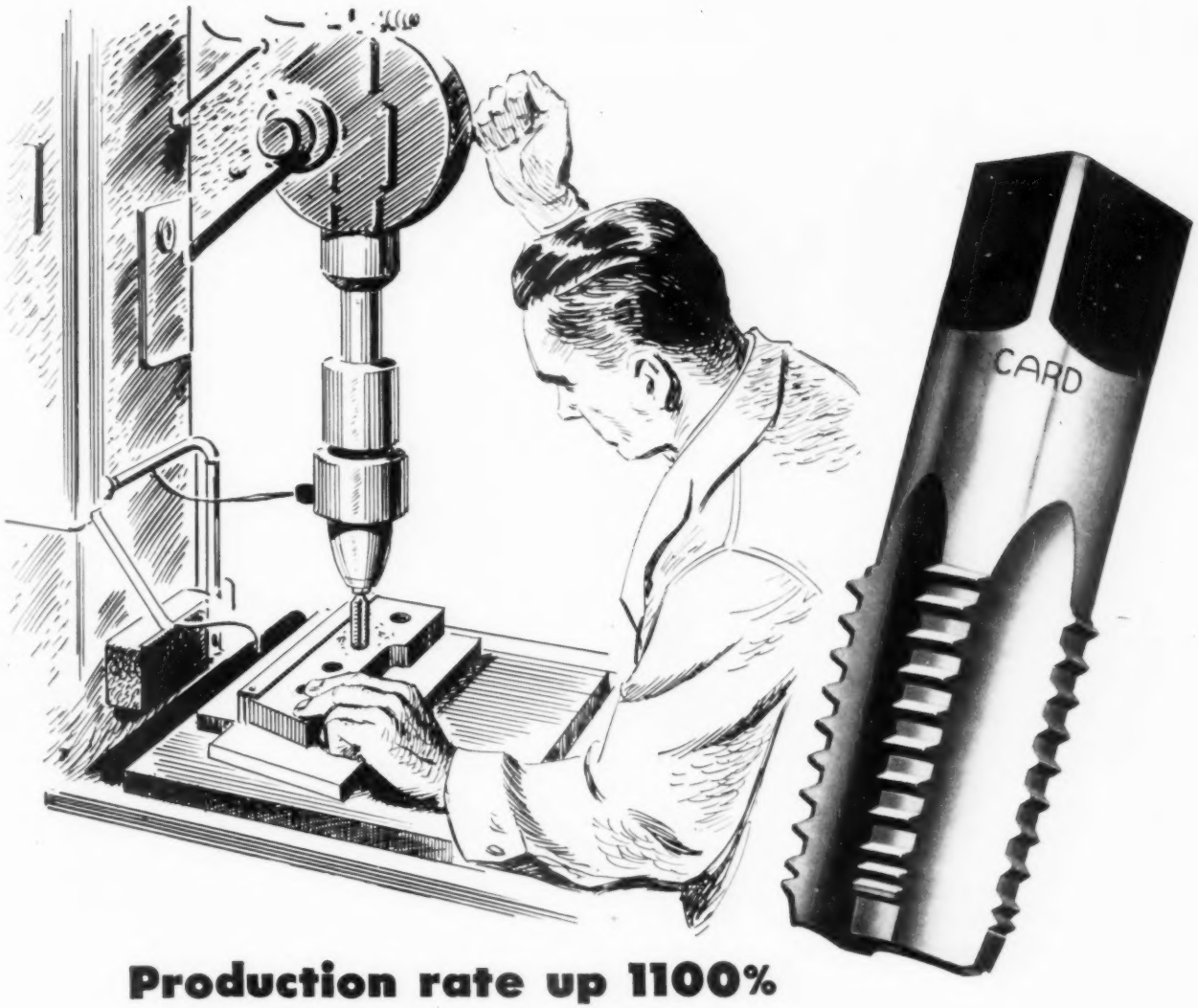

For further information write for the above catalogs

*Accuracy you can trust*

# WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • CONE-LOK JIGS • DIAPHRAGM CHUCKS AND ARBORS • PRECISION PARTS




# Production rate up 1100% when switch is made to

# CARD TAPS

The job was tapping soft steel parts made from SAE 1010 steel. The holes were extruded and tapped $\frac{3}{8}$-18 NPT. But with the taps being used a midwest metal fabricator was getting only 200 to 300 tapped holes, which was considered pretty good at the time.

Then somebody said he really ought to be getting more, so the shop superintendent decided to investigate. He called in a Card representative and talked over the matter with him. Solution: A Card High Speed Interrupted Pipe Tap was put on the job. Result: 4,267 tapped holes — or an increase in production of more than 1100%.

*Meet him.* Your Card representative, backed by Card's engineering staff is always available for aid on any problem. S. W. CARD MANUFACTURING COMPANY, Mansfield, Massachusetts. Division of Union Twist Drill Company.

***SEE YOUR CARD DISTRIBUTOR FOR PROMPT DELIVERIES AND HELPFUL SERVICE***

The CARD Quality

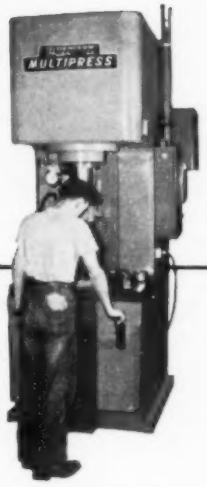
**TAPS**

***Production Proved For Lasting Accuracy***

*Also makers of* DIES • SCREW PLATES • DIE STOCKS
TAP WRENCHES

# G-E Report Verifies Advantages of Hydraulic Presses

## . . . Added Proof that MULTIPRESS® CUTS COSTS on ASSEMBLY



More proof that the right use of hydraulic pressure cuts staking costs several ways! General Electric's own experience with Multipress, in their Meter and Instrument Division, echoes gains reported by dozens of other users.

With Multipress, ram speeds and pressures are closely adjustable to each different job need, and are *automatically controlled* for continuous accuracy. This eliminates the need for skilled operators.

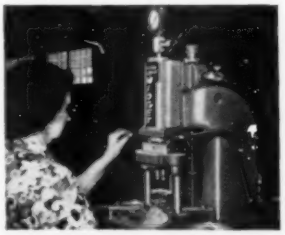
In addition, Multipress does the work *without sudden impact.* Working pressures build up *after* tooling contacts the parts. Among other advantages, this cuts tool wear and ends a major cause of tool damage.

But Multipress assures even bigger gains in reduced scrap losses, because its smooth action lets metals "flow" into place without losing their normal tension characteristics. At G-E, scrap on staking operations had often run from 5 to 25 per cent. Multipress cut these losses to *one per cent or less.*

Ease and safety of operation — plus quietness — are added Multipress features. And most Multipress advantages apply also to many other production jobs — bending, drawing, flaring, stamping, forming, blanking, riveting, and so on.

*Write today for full information on Multipress and its many accessories for special needs.*

*Multipress offers 8 frame sizes. Capacities range from one-ton to the 50-ton unit shown directly above. Model at upper left, equipped with Multipress Index Table, automatically rotates parts under press ram. Note handy storage of parts at center of table dial.*



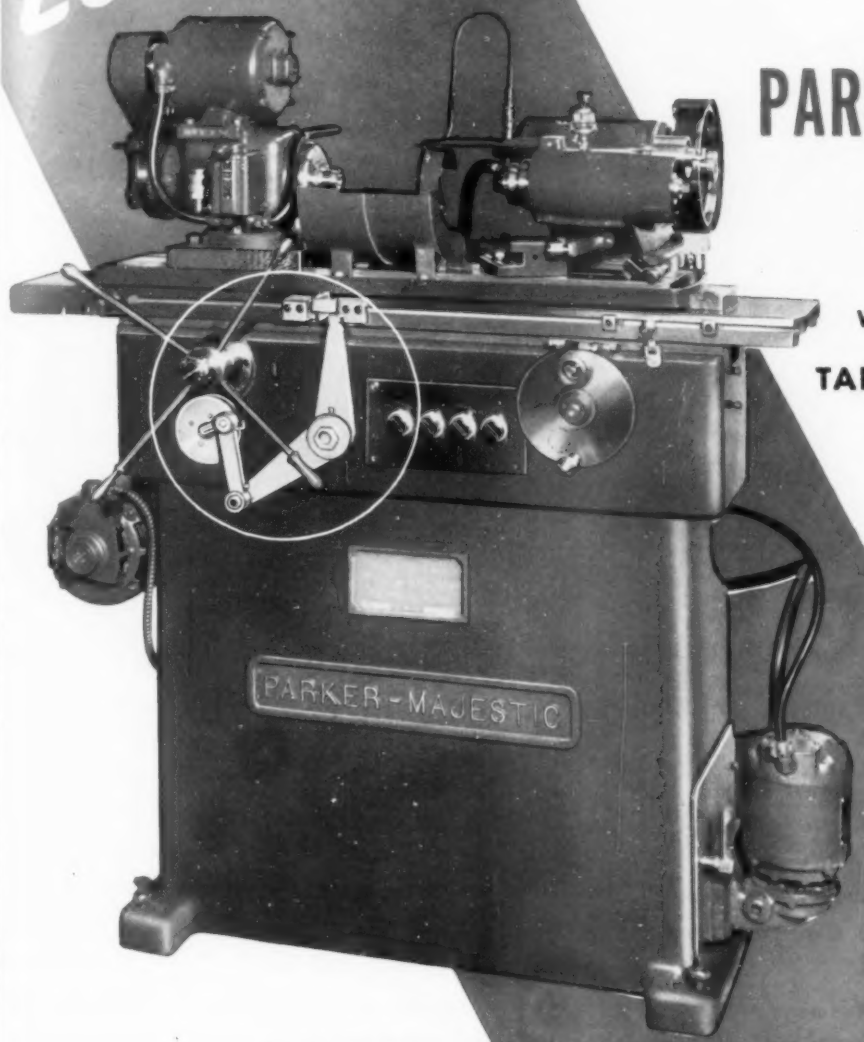
*The Multipress "Midget" offers one-ton capacity.*

**The DENISON Engineering Company**
1191 Dublin Road, Columbus 16, Ohio

**DENISON HydrOILics**

FOR ECONOMY

PRECISION MACHINES PM PARKER · MAJESTIC




# PARKER-MAJESTIC GRINDERS

WITH THE ADJUSTABLE

TABLE RECIPROCATING MECHANISM*

*Give Smoother Performance*

AND GREATER ACCURACY

## OUTSTANDING FEATURES

1. Positive Mechanical Operation.
2. Reciprocating Table travel adjustable from 0" to 3".
3. Rapid and accurate table movement.
4. Four table speeds—15, 30, 45 & 60 reversals per minute.

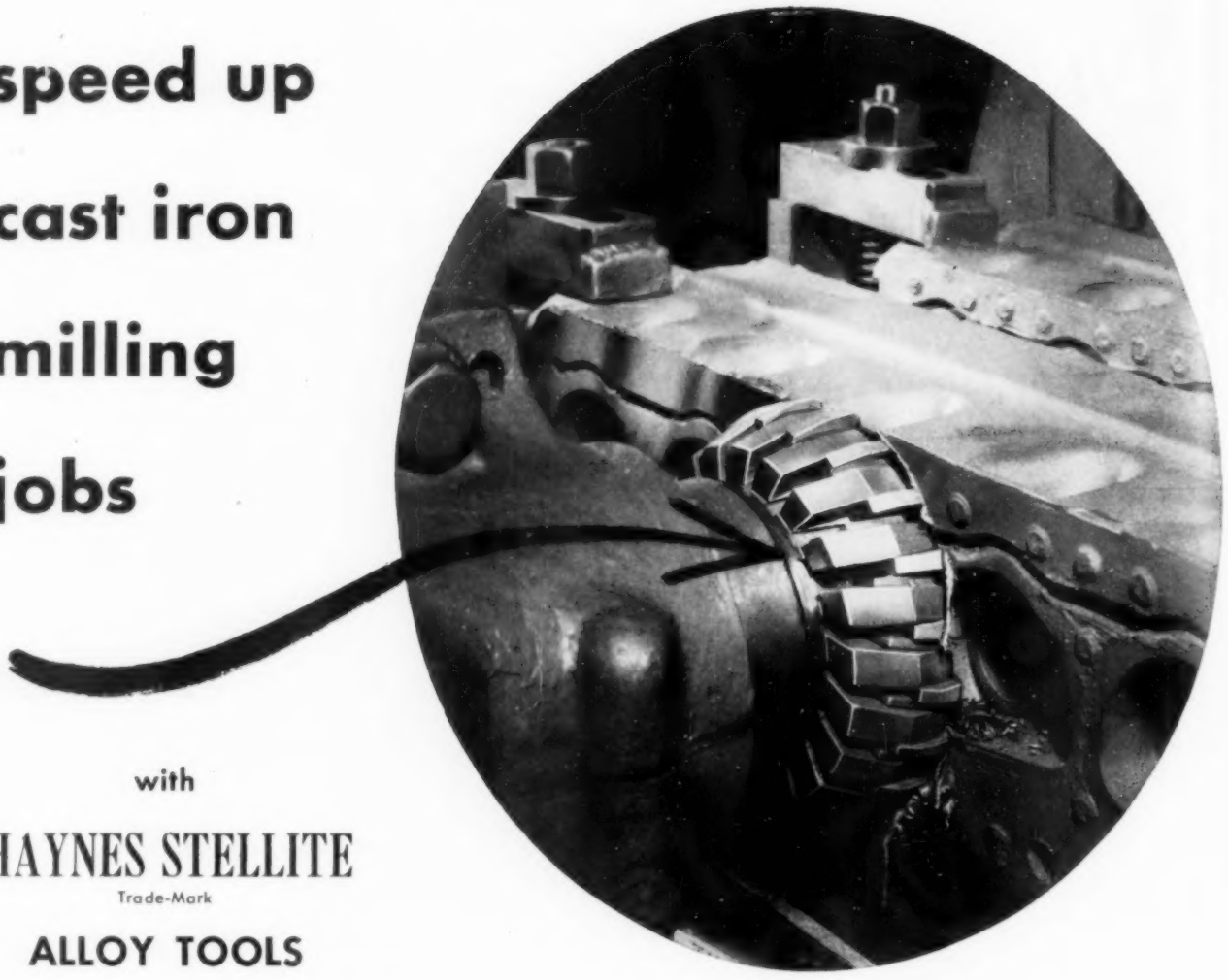
*Optional equipment with most models of Parker-Majestic Internal or External Grinders.

**PARKER-MAJESTIC, INC.**

formerly Majestic Tool & Mfg. Co.

147 JOS. CAMPAU • DETROIT 7, MICHIGAN

# speed up cast iron milling jobs



with

## HAYNES STELLITE
Trade-Mark

## ALLOY TOOLS

High compressive strength at cutting temperatures . . . good impact strength . . . and extremely low frictional coefficients make HAYNES STELLITE alloys ideal tool materials for cast iron milling jobs.

Two hard grades of HAYNES STELLITE alloy are available for milling cast iron at high speeds. On soft cast iron (less than 185 Brinell), these tools can take light milling cuts at speeds up to 300 surface ft. per min. For heavy milling, speeds up to 250 surface ft. per min. can be used.

Hard cast iron up to 240 Brinell can be milled at speeds as high as 200 surface ft. per minute. Safe chip loads range up to 0.025 in. per tooth.

Tougher grades of HAYNES STELLITE alloy are available for efficient milling of castings that have irregular contours, surface imperfections, or inclusions, or where there are variations in chill depth.

HAYNES STELLITE alloy tools are available as fabricated shell-end mills and as insert milling-cutter blades. The different grades of alloy can be used for a wide variety of milling conditions. If you wish help on your own particular milling problems, write to the nearest Haynes Stellite Company office.

For a copy of the new manual, "HAYNES STELLITE Metal-Cutting Tools," write to our General Offices.

**HAYNES**
TRADE-MARK
*alloys*

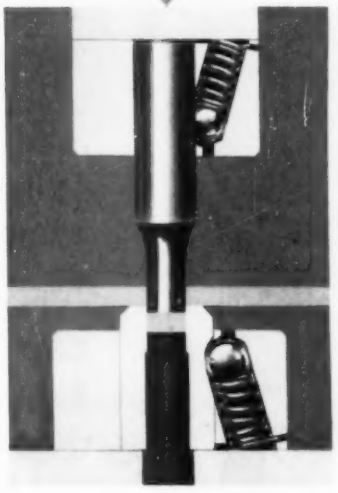
**Haynes Stellite Company**
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles — New York — San Francisco — Tulsa

"Haynes" and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation.

# Special Punches *with* Standardized R-B Features

Save time in die designing, construction and use by adopting as your tooling standard the most widely accepted piercing system in the industry. This standardized R-B concept of interchangeable punches and die buttons will efficiently answer your needs on both simple and complex applications.

The standardized R-B ball lock in special or standard retainers gives positive radial alignment to all R-B punches and mating dies without additional keying. This same spring loaded ball lock permits quick changing of punches yet holds them securely in place.



Special punch-points of any shape or size can be made to your specifications and these punches will have all the desirable features of standard R-B equipment. Also, R-B guarantees continuing benefits from standardization by manufacturing each punch and die button to print dimensions, thus insuring identical replicas when replacements are required.

TOOL STANDARDIZATION IS THE BASIS FOR EFFICIENT AND ECONOMICAL PRODUCTION. WITH R-B YOU GET THE ACCEPTED STANDARD OF THE SHEET METAL INDUSTRY—IN STANDARD DESIGN FEATURES THAT SAVE IN ENGINEERING, DIE CONSTRUCTION AND OPERATION.

**RICHARD BROTHERS DIVISION**
**ALLIED PRODUCTS CORPORATION**
**DEPT. 68 • 12667 BURT ROAD • DETROIT 23, MICH.**


Please send me additional information.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

*Also Produced in*
**ALLIED'S FOUR PLANTS**
HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS • SHEET METAL DIES • ALLITE DIES CAST OF ZINC ALLOY • JIGS • FIXTURES

# TOOLING ENGINEER

Nationally known firm is seeking Chief Tool Engineer for Southern California plant. Qualifications: Broad experience in tooling and high production machine shop methods including extensive tool design and shop experience; good knowledge of cutting tool selection and use, particularly with cast iron, and familiarity with heat treating and plating. Pressed metal tooling experience also desirable. This is a permanent position with excellent future. Please give a complete resume of education, experience and background in first reply. Box 251.

THE TOOL ENGINEER
10700 PURITAN AVENUE
DETROIT 26, MICHIGAN

USE READER SERVICE CARD; INDICATE A-1-238-1

"M-B" Model U-TR
UTILITY Pneumatic
GRINDER
60,000 RPM

A powerful, fast-cutting tool, streamlined in design, easy to handle. Designed for real production work and the toughest jobs. Precision made, excellent balance. Special grease-sealed bearings . . . no lubrication required. Fitted with steel housing, a special safety feature.

*Remember, Built-in Quality remains long after First Cost disappears.*

Also other Grinders, Speeds 40,000 to 100,000 R.P.M. Such as to operate Tungsten Carbide Burrs, Rotary Files, etc., to full efficiency.

•

Automatic Air Line Filters, Regulators and Lubricators.

*Write for Literature*

M·B PRODUCTS
46 Victor Ave.
DETROIT 3, MICHIGAN

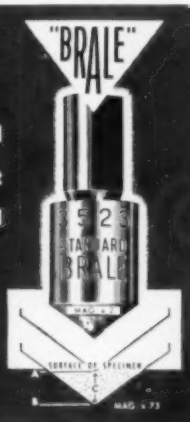
USE READER SERVICE CARD; INDICATE A-1-238-3

an ACCO product

Sphero-Conical
DIAMOND BRALE* PENETRATOR
for Hardened Steel

HOW IT WORKS

A. Minor Load Penetration
B. Major Load Penetration
C. Linear measurement of penetration increase which "ROCKWELL"** converts to hardness reading




**BRALE Penetrator Accuracy Is Proved in Wilson's Standardizing Laboratory**

One point of hardness on the Rockwell C scale equals .00008", so penetrator accuracy must be constant. That's why Wilson maintains its Standardizing Laboratory for testing and approving every BRALE penetrator.

Each BRALE is precision ground to shape under high magnification to research laboratory accuracy. Wilson's BRALE Penetrator gives true readings at all dial points. For accuracy use a diamond BRALE penetrator on your hardness tester. Write for literature.

*Trade Mark Registered

WILSON MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE
Park Avenue, New York 17, N. Y.

WILSON "ROCKWELL" and TUKON Hardness Testers

USE READER SERVICE CARD; INDICATE A-1-238-2

To Obtain Further Information About Advertisers, Trade Literature or Tools of Today Appearing in this issue of The Tool Engineer, Use the Handy Readers Service Card on Page 131.

EFFICIENT—LOW COST PRODUCTION
MEANS ROUSSELLE PUNCH PRESSES

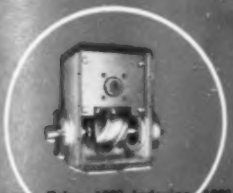

SERVICE MACHINE COMPANY
7627 S. Ashland Ave. • Chicago 20

USE READER SERVICE CARD; INDICATE A-1-238-4

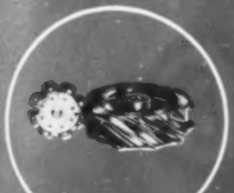
*Designers and users of machinery employing . . .*

**INTERMITTENT MOTION**

Roller—A[illegible] Oscillating Movement. 90° Rest, 90° Movement, 90° Rest, 90° Return. Load: 150 Inch-Lbs. Torque @ 120 R. P. M. Use: Electric Motor Stator Winders.



Roller—8 Stop Drive. 180° Indexing, 180° Dwell. Load: 1270 Inch-Lbs. Torque @ 150 R. P. M. Use: Bottle Crown Assembly Machine—Dial Drive.



Roller—2 Stop Drive. 240° Indexing, 120 Dwell. Load: 250 Inch-Lbs. Torque @ 150 R. P. M. Use: Electric Motor Coil Winders.

# replace GENEVA DRIVES with PRECISE, VERSATILE AND DURABL

# ferguson ROLLER GEAR DRIVES

## FOR HIGH SPEED OPERATION!

Roller—4 Stop Drive. 240° Indexing, 120° Dwell. Load: 225 Inch-Lbs. Torque @ 300 R. P. M. Use: Web Paper Feed Drive—Multi-color Printing Press.

Roller—10 Stop Drive. 120° Indexing Period. Load: 650 Inch-Lbs. Torque @ 110 R. P. M. Use: Dial Indexing—Centerless Grinding Machine.

**ferguson** ROLLER DRIVES REQUIRE NO MAINTENANCE FOR AT LEAST 8000 HOURS OF OPERATION AND CAN BE RENEWED AT ANY TIME MERELY BY REPLACEMENT OF STANDARD BALL BEARINGS.

*FERGUSON DRIVES REPLACE:*

GENEVA DRIVES (any type)

RATCHET AND CRANK MECHANISMS

AIR OPERATED INDEXING MECHANISMS

CAM OPERATED INDEXING MECHANISMS

Other intermittent motions—either lineal or angular

Ferguson Roller Gear Drives are custom-engineered to meet your exact requirements. Our engineers are always able to help you solve any problems concerning intermittent motion or indexing mechanisms on automatic machines.


*"Burrmaster" Gear Deburring Machine, Manufactured by* MODERN INDUSTRIAL ENGINEERING COMPANY *with Ferguson Roller Gear Drive as used by the Ford Motor Co. 8 Roller — 8 Stop Drive. 140° Indexing Period. Design Load, 340 inch-lbs. at 400 indexes per minute.*

ROLLER GEAR DIVISION Dept. J-10

**FERGUSON MACHINE & TOOL CO.**

471 Paul Ave., Ferguson Sta. • St. Louis 21, Mo.

**BOOTH 1315**
FOURTH PLANT MAINTENANCE SHOW
Cleveland, Ohio
JAN. 19-22

*"... helping to keep the business cycle on an even keel ..."*

**HARRY B. HIGGINS**
President, Pittsburgh Plate Glass Company

***"The employees of Pittsburgh Plate Glass Company since 1946, have purchased $9,488,510 in United States Savings Bonds through the Payroll Savings Plan. This accumulation of assets will be of inestimable value in helping to keep the business cycle on an even keel by maintaining purchasing power for the future."***

Payroll Savings—the plan that protects—pays the employer *triple* benefits:

- it makes a good employee a better one—a serious saver with a definite plan for personal security.
- as enrollment on the plan goes to 60%, 70% employee participation, productivity increases, absenteeism decreases and accident records go down.
- and as Mr. Higgins points out, the systematic purchase of Defense Bonds through the Payroll Savings Plan is building a tremendous reserve of purchasing power.

Let's point up the third employer benefit with a few figures:

- On September 30, 1951, individuals held Series E Bonds totaling $34.6 Billion—more than $4.6 greater than on V-J Day.
- During the five calendar years (1946-1950) Defense Bonds sales provided:

—*Cash* to retire $3 Billion A-D Savings Bonds (maturing Series).

—*Cash* to meet $24 Billion redemptions of E, F and G Bonds.

—$6 Billion (after providing cash for the payments enumerated above) that the U.S. Treasury could use to pay off bank-held debt.

And the figures are getting better every day—between January 1, 1951 and November 1, 1951, 1,200,000 employed men and women joined the Payroll Savings Plan.

If the employee participation on your Payroll Savings Plan is less than 60%, phone, wire or write to Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D.C. Your State Director will be glad to show you how you can participate in the triple benefits of the Payroll Savings Plan.

*The U.S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and*

**AMERICAN SOCIETY OF TOOL ENGINEERS**
**10700 Puritan Avenue** **Detroit 21, Michigan**

# "no more GAMBLING on tool steel selection"


[⅓ actual size; Selector is in 3 colors]

That's what one of the thousands of pleased users says about his CRUCIBLE TOOL STEEL SELECTOR, the new, simple, handy method of picking the right steel, *right* from the start. Since Crucible announced this Selector two years ago, thousands of tool steel users have received their Selectors . . . and here's what some of them say—

*"Handiest selector I've ever seen!"*

*"Saves me time and headaches"*

*"It's so logical—you begin with the application".*

You can be sure the answer you get with your Crucible Tool Steel Selector will be just right in every case, for this Selector covers 22 tool steels which fit 98% of all tool steel applications. And when—with a flip of the round dial—you get the answer, you'll get the steel FAST, too, because all the tool steels on the Selector are right in stock, in all our 26 conveniently-located warehouses.

This Selector is bound to be a big help to you—so write for yours today. There is no obligation whatsoever. Just fill in the coupon and mail now . . . before you turn this page and forget! CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, New York.

***Here's how it works:***

To use the Selector, all you need know is the characteristics that come with the job: type and condition of material to be worked, the number of pieces to be produced, the method of working, and the condition of the equipment to be used.

**FOUR STEPS**—and you've got the right answer!

1. Move arrow to major class covering application
2. Select sub-group which best fits application
3. Note major tool characteristics (under arrow) and other characteristics in cut-outs for each grade in sub-group
4. Select tool steel indicated

That's all there is to it!

***Here's an example:***

**Application**—Deep drawing die for steel

**Major Class**—Metal Forming—Cold

**Sub-Group**—Special Purpose

**Tool Characteristics**—Wear Resistance

**Tool Steel**—Airdi 150

One turn of the dial does it!

*And you're sure you're right!*

**Crucible Steel Company of America**
**Dept. T, Chrysler Building, 405 Lexington Avenue**
**New York 17, N. Y.**

Gentlemen:

Sure! I want my free CRUCIBLE TOOL STEEL SELECTOR!

Name_____ Title_____

Company_____

Street_____

City_____ State_____

**CRUCIBLE** first name in special purpose steels

**TOOL STEELS**

*52 years of Fine steelmaking*

**Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DENVER • DETROIT HOUSTON, TEXAS • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH • PROVIDENCE ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.**

# American Society of Tool Engineers Data Sheet Reprint Program

Because of the extraordinary growth of the Society, ASTE members have been receiving only those data sheets of most recent issue. To correct the situation the National Standards Committee has prepared with the help of manufacturers to reproduce as many as possible of the data sheets issued under the Numerical System instituted in 1946. Listed here are those data sheets that have been processed through the reprint program to date.

**Members may at no charge obtain a copy of any of the listed data sheets should they be missing from their binders.**

**A handling charge is made to non-members who may wish copies of these sheets.**

Please indicate by a check mark those required.

| *Index No.* | *Company or Organization* | *No. of Sheets* |
|---|---|---|
| 09-54000 | Industrial Diamond Association of America, Inc. | 17 |
| 25-78900 | Hardware Products Company | 1 |
| 25-92000 | American Metal Hose Branch of The American Brass Co. | 3 |
| 25-94310 | Bristol Company | 1 |
| 31-83112 | Bunting Brass & Bronze Company | 4 |
| 34-43000 | V & O Press Company | 6 |
| 34-51181 | Lincoln Electric Company | 1 |
| 34-73134 | Gatco Rotary Bushing Company | 1 |
| 34-91040 | National Twist Drill & Tool Company | 6 |
| 34-91047 | Connor Tool and Cutter Company | 3 |
| 34-91048 | Gairing Tool Company | 1 |
| 34-91050 | National Twist Drill & Tool Company | 7 |
| 34-91076 | Gairing Tool Company | 1 |
| 34-91080 | National Twist Drill & Tool Company | 2 |
| 34-91210 | Link Industries | 1 |
| 34-91231 | Gairing Tool Company | 1 |
| 34-91232 | Gairing Tool Company | 1 |
| 34-91233 | Gairing Tool Company | 1 |
| 34-93010 | Scully-Jones & Company | 1 |
| 34-93012 | Scully-Jones & Company | 1 |
| 34-93030 | Davis Boring Tool Division (Giddings & Lewis Machine Tool Co.) | 2 |
| 34-93030 | Gairing Tool Company | 1 |
| 34-93064 | Scully-Jones & Company | 1 |
| 34-93068 | Scully-Jones & Company | 1 |
| 34-93072 | Gairing Tool Company | 1 |
| 34-93078 | Scully-Jones & Company | 1 |
| 34-93170 | Giddings & Lewis Machine Tool Co. | 1 |
| 34-93190 | Scully-Jones & Company | 1 |
| 34-93997 | Scully-Jones & Company | 1 |
| 75-31470 | Bristol Company | 1 |

NATIONAL STANDARDS COMMITTEE, Dept. 1
AMERICAN SOCIETY OF TOOL ENGINEERS
10700 Puritan Ave., Detroit, Michigan

Please forward data sheets indicated .....

.....

Name.....

Street.....

City..... State.....

Membership No.....

Chapter Name.....

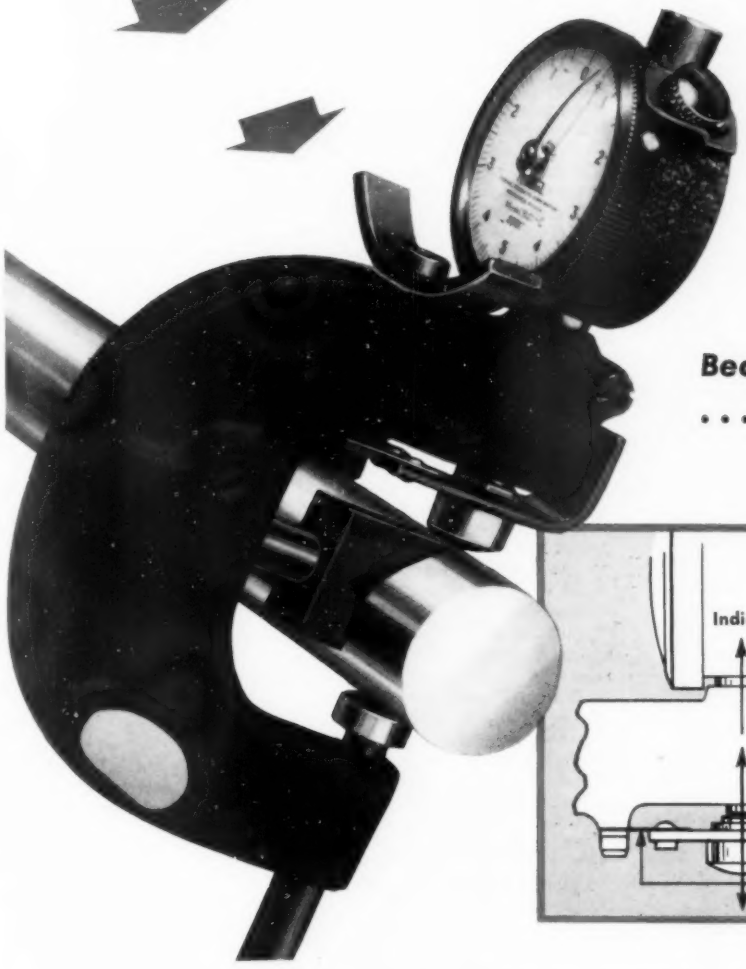
**Charge to non-members is .05c per sheet, minimum order .50c.**

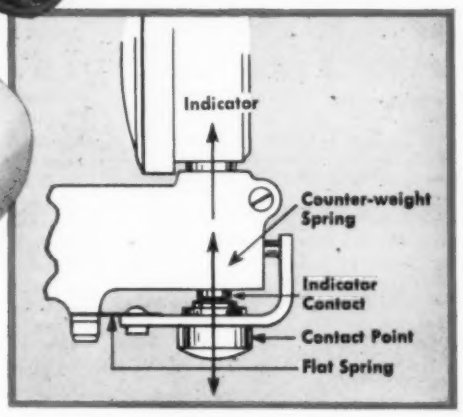
Full payment must accompany orders.

# Side Thrusts and Friction Don't Affect this

# SNAP GAGE

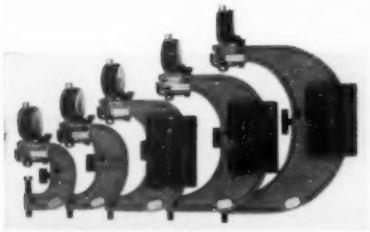
***Because the Dial Indicator is free . . . while measuring the dimension***






### *UNAFFECTED BY SHOCKS AND FRICTION*

The flat spring supporting the contact point takes all the shocks and side thrusts — the indicator contact point merely rides on the gage contact point. There is no tendency for the indicator spindle to bind. Counterweight spring offsets weight of gage and of inspector's hand.



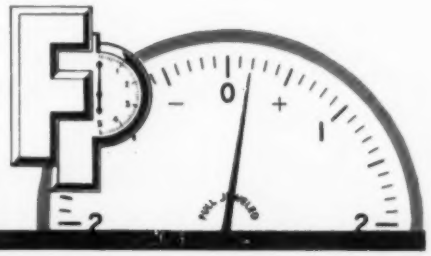
Model 1000 P-1 (0″ to 1″)
Model 1000 P-2 (¾″ to 2″)
Model 1000 P-3 (1¾″ to 3¼″)
Model 1000 P-4 (3″ to 4½″)
Model 1000 P-5 (4″ to 6″)
Price, any one gage with .0005″ grads. $57.50
Price, any one gage with .0001″ grads. $75.00
Larger sizes special

**FEDERAL MODEL 1000 SERIES GAGES** *show you the amount of error* so you can make corrective adjustments *before you begin to produce scrap.* Measurements are not influenced by "feel" and any operator obtains the same reading. These gages are fast, lightweight, and more accurate than conventional "go, no-go" gages.

Five gages enable you to inspect *all* dimensions from 0″ to 6″. There are no extra gage costs when size requirements change — Adjustments can be made easily with a screw driver! Write for folder on these modern gages. Federal Products Corporation, 1191 Eddy Street, Providence 1, R. I.

**FEDERAL**

**Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES**



# Index of The Tool Engineer Advertisers

**January, 1953**

The Index to Advertisers is published as a reader service. Although every precaution is taken to assure correct listing, no allowance will be made for error or omission.

♦User of ASTE Data Sheets

## THE TOOL ENGINEER REGIONAL ADVERTISING OFFICES

| EASTERN | OHIO | CENTRAL | WESTERN | PACIFIC COAST |
|---|---|---|---|---|
| Austin G. Cragg<br>400 Madison Ave.<br>Phone: Plaza 9-4018<br>New York 17, New York | Richard E. Cleary<br>Commercial Bank Building<br>Phone: Berea 4-7719<br>Berea, Ohio | Clarence T. Etter<br>10700 Puritan Avenue<br>Phone: University 4-7300<br>Detroit 21, Michigan | Stanley F. Girard<br>50 N. Michigan Ave.<br>Phone: Michigan 2-4465<br>Chicago 11, Illinois | W. R. McIntyre<br>423 First Trust Bldg.<br>Phone: Ryan 1-6981<br>Pasadena 1, California |


# Work savers-cost cutters job speeders-in any shop

Save time spent tooling up solid mandrels. CHAMPION mandrels automatically expand to exact, positive, concentric fit as the flexible sleeve is moved along the tapered arbor. Work quickly set up; easily taken down. Production costs cut, whether the job calls for machining only one piece or ten thousand pieces.

**Precision Model** positively guaranteed for precision grinding, turning and milling operations. Ideal where accuracy and time-saving are of utmost importance. Available in standard sizes from ½" through 3" diameter, graduated by 1/16". Arbor built for heavy loads. Sleeve has range of .010", from .003" under to .007" over nominal size. Positive stop at maximum size prevents overstrain. Holds tolerances of .0002" run out. Withstands hardest wear; permanent accuracy is assured.

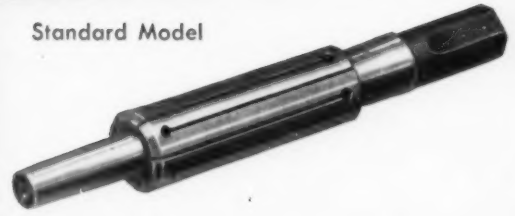
Precision Model

# CHAMPION E-X-P-A-N-D-I-N-G MANDRELS

**Standard Model** used throughout the world. Standard tool room equipment in all phases of modern industry. A set of twelve will completely and accurately fill any hole from ½" to 7" diameter — replace hundreds of solid mandrels costing many times as much. Show negligible wear after years of use. Maintain close tolerances; handle material of any length bore, hard or soft metals, from thin tubes and bushings to heavy castings and forgings.

CHAMPION *Expanding Mandrels can be made in special shapes and sizes to fit any specification. Quotations on request. When writing, please address Dept. 100.*

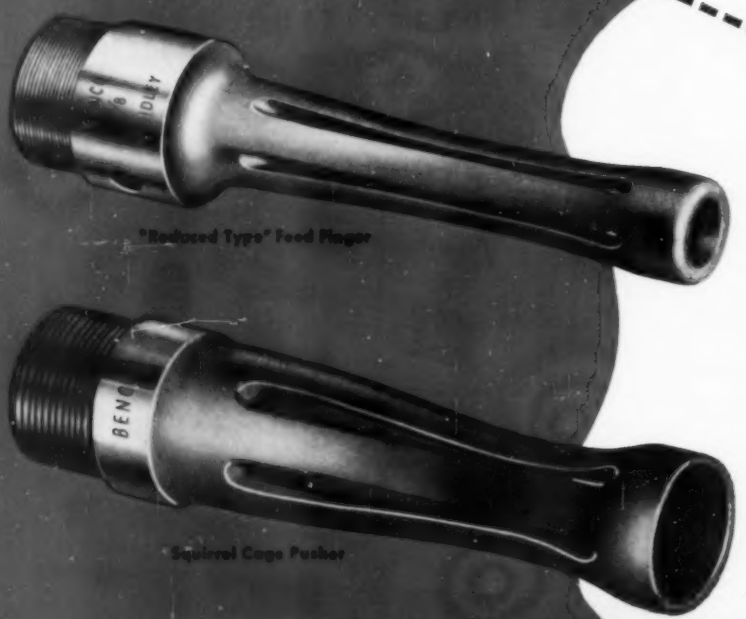
Standard Model



**WESTERN TOOL & MFG. CO., INC. • SPRINGFIELD, OHIO**

# BENCO

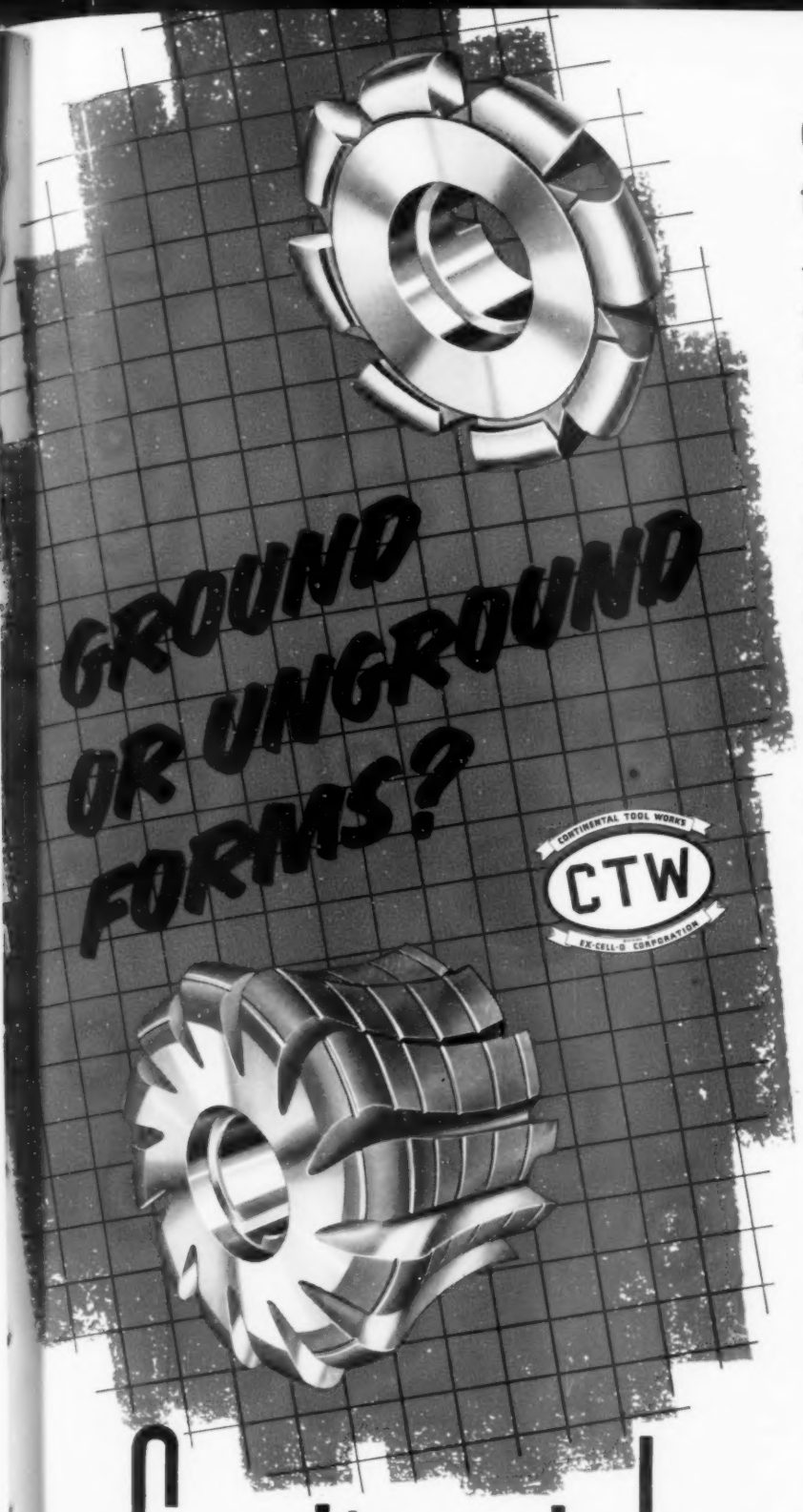
## better PUSHERS




Extraordinary production records with a wide range of feeds and speeds are not unusual on machines equipped with Benco Pushers or Feed Fingers. Benco Pushers are engineered and built to provide efficient, dependable feeding and the elimination of stock scoring. Continued dependable performance at lower production costs with resultant savings of time and money may depend on the proper selection of pushers and feed fingers...choose Benco and you'll choose the finest.

Always Better Constructed
Accurate Benco Collets, Pushers and Pads

**BENCO COLLET MANUFACTURING COMPANY**
CLEVELAND 14, OHIO




# Continental
## TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

## CONTINENTAL Makes Both to Suit Your Requirements

The form-relieved milling cutter at the left above has a ground form, while the cutter below has an unground form. Both are easily sharpened by grinding the faces of the teeth.

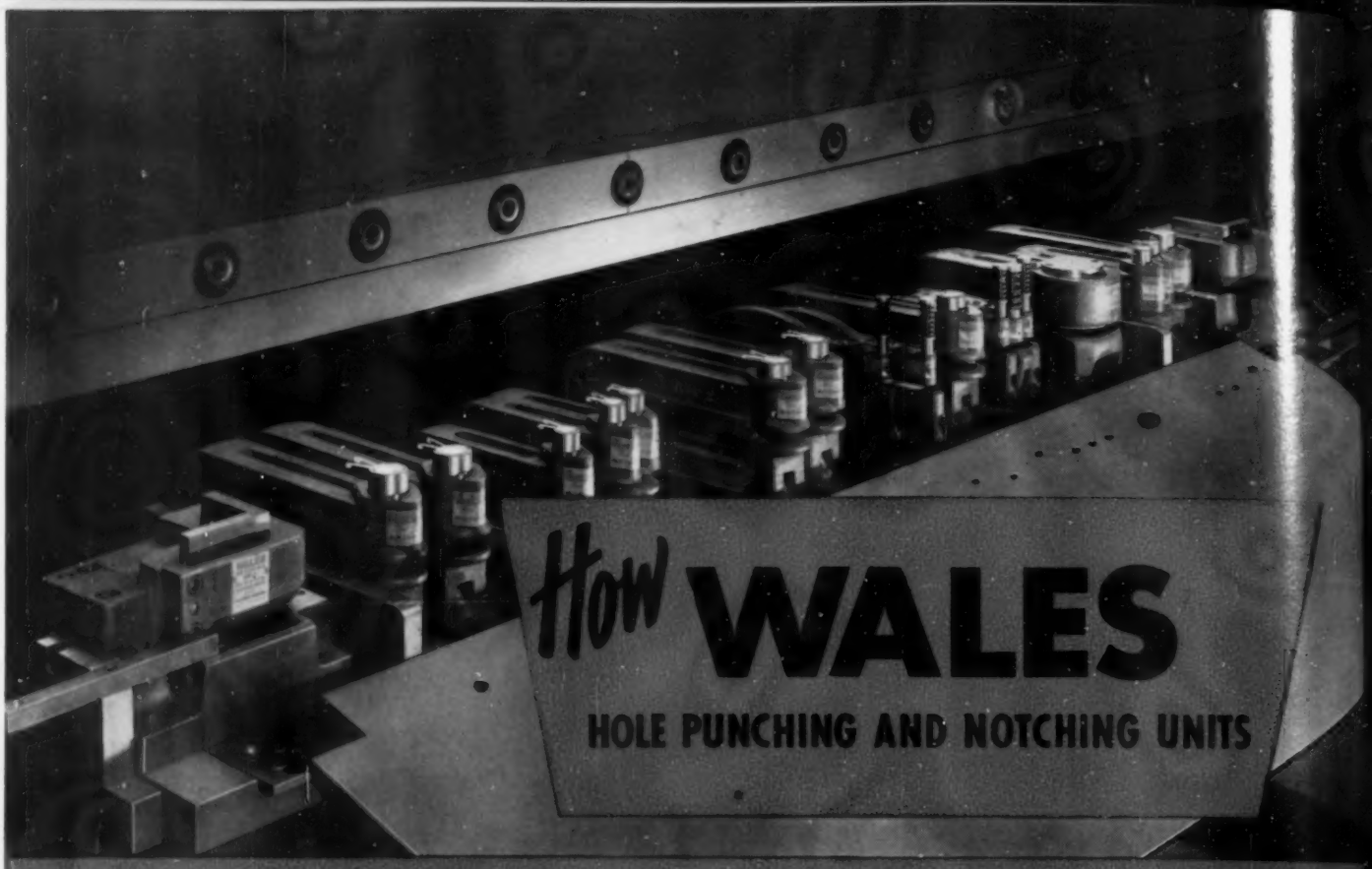
If limits are within plus or minus .001", if the form has several angles or radii, or if the job requires a fine surface finish, then we recommend the ground form. The grinding operation corrects any distortion caused by heat-treatment, insuring an accurate form and a true-running cutter for a good work finish. However, if tolerances are not too close and the form is not too intricate, you can save money by using unground form-relief cutters.

Continental, being a division of Ex-Cell-O, supplies the tools used by Ex-Cell-O for the volume production of precision parts for aircraft and other industries. This work provides an exceptional opportunity to try out various tool designs and materials and to determine definitely the best tools for today's production needs.

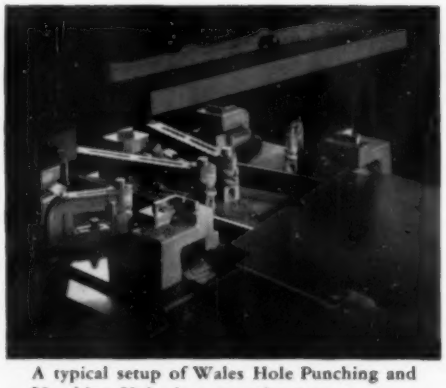
These facts can mean real savings to you. Call in your Ex-Cell-O representative or contact Continental in Detroit today for information on Production-Proved Cutting Tools.

**In this group of special Continental tools are ground and unground form-relieved cutters, flat form tools, an offset carbide tipped tool and a double-end carbide tipped spot-facer.**

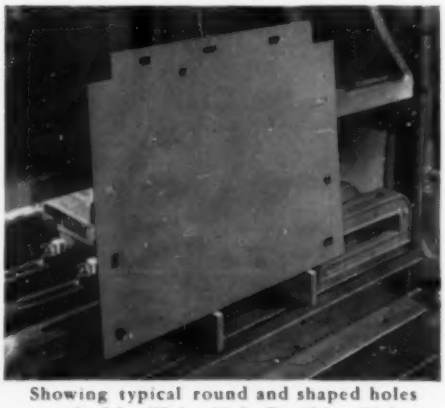
52-16




A typical *press brake* setup of Wales Hole Punching and Notching Units.



A typical setup of Wales Hole Punching and Notching Units in a *stamping press.*



Showing typical round and shaped holes punched by Wales Hole Punching Units. Note corners have been notched by Wales Notching Units.

## MAKE FASTER, MORE ECONOMICAL SETUPS IN STAMPING PRESSES AND PRESS BRAKES

. . . *By eliminating* the time consuming operation of aligning each set of punches and dies.

. . . *By eliminating* special punches, punch plates, stripper plates, die buttons and die plates.

. . . *By eliminating* "dead storage" of setups and tooling investments—Wales Units drastically reduce setup and production time plus cutting initial and operating costs.

These tooling efficiencies are made possible by the *exclusive* independent, self-contained design that holds all working parts as a single hole punching or notching unit. A group of Wales Units may be set up in unlimited patterns and in many cases, put into operation the same day a pattern is released for production.

For the complete story on this faster, more economical production technique that has revolutionized tooling practice, write TODAY for fully-illustrated, functionally-colored Catalog BL and Catalog N.

**WALES-STRIPPIT CORPORATION**

George F. Wales, *Chairman*
393 PAYNE AVE.
*(Between Buffalo and Niagara Falls)*
Wales-Strippit of Canada, Ltd., Hamilton, Ontario

***Specialists in Punching and Notching Equipment***